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ABSTRACT

Reports of educational policy and planning problems in Greece, Portugal, and Turkey are presented in this volume. It is the second part of a study by the Organization for Economic Cooperation and Development to determine how educational systems function (see SO 011 254). In this volume each country's research team presents their work to date, discusses the problems they encountered, and proposes solutions. The Greek report is an analysis of how educational decisions are made at all levels and whether the decision-making process at critical points is satisfactory. Specifically, it examines how policies are set on high-order goals, how low-order decisions are made for implementing policy decisions, and how financial decisions are made. The report from Portugal is an assessment of the resource implications of introducing a new educational structure. It examines data collection, techniques to be employed in introducing the new system, estimation of student and teacher supply and demand, capital, and current expenditures. The Turkish report is a study of the existing administrative structure of the public education system at regional and local levels. (RM)

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DECISION-MAKING IN EDUCATIONAL SYSTEMS

The Experience in Three O.E.C.D. Countries

Country Reports: Summaries

Volume II

SO 011 255

Paris 1976

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PREFACE

In Volume I, the principal aim was to discuss the work undertaken under the three country projects within a conceptual planning decision-making framework. Discussion of the detailed content of each project, therefore, was kept to the minimum requirements necessary for an understanding of the general argument and illustration of specific points raised in the analysis.

In the present volume, shortened versions of the three country reports are presented for the reader who may be interested in the detailed aspects of the work carried out. In this way, although the two volumes constitute an entity, each volume may be read independently of the other.

The Greek Project, which deals in general with the analysis and evaluation of the Greek educational decision-making system, is presented under the following themes:

Introduction: a brief description of the Greek educational system at the time of the study;

The Goal Setting Sub-System: an attempt is made to detect how policies on high order goals are set, and whether adequate communication exists between the educational system and the other social systems which have educational needs and/or interests;

The Decision-Making Sub-System dealing with low order decisions required for implementing policy decisions; an effort is made to measure the "importance" of each decision with a view to re-allocating decision-making authority;

The Financing Sub-System dealing with decisions related to the financing process of the educational system.

In the entire study, the emphasis is placed on the communication, planning and control aspects of the whole spectrum of the policy/decision-making process.

The main aim of the Portuguese Project was to assess the human and material resource implications for implementing a new structure

C

proposed for the Portuguese educational system (excluding the post-secondary level, with the exception of teacher training colleges).

Since the project deals with an actual planning/programming exercise at the national level, the report is concerned primarily with the presentation of the work involved in estimating the resource implications of introducing a new educational structure - starting with data collection, decisions on the techniques to be employed, application of the technique and actual estimation of all necessary magnitudes, i.e. student demand and supply; teacher demand and supply; capital and current expenditure.

During the implementation of the project, several ad hoc studies were made, e.g. on qualified manpower forecasts, the creation of centres for higher education, a simple linear programming model, and school system dynamics. These studies (although they were not directly used in the work reported in the main Portuguese report) are given in the appendices.

The Turkish Project confined itself to the analysis and evaluation of the existing administrative structure of the public educational system at the regional and local levels.

The report, therefore, after presenting as an introduction a brief description of the general structure of the Turkish educational system, provides in its subsequent chapters detailed information on the methodology followed; the questionnaire used for gathering the appropriate information directly from the operation of educational policies at the provincial and local levels; the results obtained after the analysis of the questionnaires; and a number of recommendations which emanate naturally from the evaluative analysis.

The implementation of the three country studies was entrusted to national teams, which worked in close collaboration with the OECD Secretariat. Two of the national teams, in Greece and in Portugal, were assisted in various stages of the work by outside consultants, namely, Dr. Coyle, Director of Systems Dynamics Research Group, University of Bradford, and Dr. Simpson, Director of the Department of Operational Research, University of Lancaster, respectively, whose services were made available through the OECD Technical Co-operation Programme.

The Greek summary report was written by the project leader Dr. Psoinos, former Director of the Department of Planning and Operational Research, Ministry of Education, Greece; the Portuguese by Dr. Simpson and the Turkish by Dr. GüclÜol, leader of the Turkish project.

The views expressed in these reports are those of the authors and do not necessarily reflect those of the OECD or of the national authorities concerned.

GREECE

FOREWORD

This report is a shortened version of the main Greek Report which Dr. Psoinos prepared from a study included in the special programme of the OECD on Planning and Management of the Educational Systems in the Mediterranean Member Countries which was completed in 1973.

The study was carried out by a team of Greek administrators and experts under the guidance of Dr. D. Psoinos, Scientific Director of the Project. The members of the team were: C. Aronis, M. Georgandopoulos, G. Giavas, G. Katsoulas, D. Kazis, L. Koulas, S. Lalios, J. Masson, E. Nash, D. Papayannis, G. Stamatiadis, A. Tsitos and D. Tsohandaris. Dr. R. Coyle from the University of Bradford, U.K., assisted the Greek team at various stages of the Project. Some of Dr. Coyle's general ideas are presented in Annex B attached to the present Summary Report.

The Greek team followed, as far as was practically possible, the general methodological framework provided by the OECD Secretariat*. The methodology applied to the decision-making sub-system was developed by Dr. Psoinos.

There have been many changes in the Greek educational system since this study was carried out, and these are referred to in the text wherever possible. In spite of these changes, many of the more deeply rooted characteristics in the functioning of the Greek educational system will however continue to call for a forceful effort to re-examine the overall structure of the system and to redefine its functions at each and every educational level.

It is hoped that the present study will provide useful objective evidence and suggestions as to possible changes that may be of help to those responsible for educational policy developments in Greece.

At the same time, the report presents a specific case study on a methodological approach to the study of educational policy/decision-making processes which may prove helpful for similar studies in other countries.

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* OECD "Systems Approach to Educational Planning and Management", DAS/EID/71.34 (Working Document)

CHAPTER 1

INTRODUCTION

1.1 The main purpose of the study was to make a systematic diagnosis of some of the problems related to planning and management procedures in the Greek educational system with a view to suggesting any changes necessary to increase the system's effectiveness. More particularly, the study confined itself to the policy/decision-making processes. It attempted, for the first time in Greece, to investigate systematically the existing ways and means used for policy/decision-making in order to detect possible deficiencies.

The study being a diagnostic one was not intended to provide solutions to problems but rather to identify them. To find solutions to these problems would most probably require more in-depth study. In spite of this, the report does include, where possible, suggestions that may prove helpful.

A general methodological framework based on social systems and using cybernetic concepts was followed. Briefly, the formal educational system, seen from a decision-making point of view, was divided into two sub-systems: the Goal Setting (or policy-making) Sub-System, which deals with high level policy questions and the Decision-Making Sub-System, which deals with decisions for implementing the policies adopted (sometimes these decisions are also called routine decisions).

Since great importance is attached to decisions related to the financing process of the educational system, this process was studied separately as a special sub-system: the Financing Sub-System.

In the study, special attention was given to the communication, planning and control aspects of the decision-making processes since they are considered vital for the effective and efficient functioning of any social system such as education.

For a better understanding of the study, a brief description of the structure of the Greek educational system and its administration is given on the following page.

CHAPTER 2

THE GREEK EDUCATIONAL SYSTEM

2.1 The Greek educational system has the following traditionally structured levels:

- Pre-primary education
- Primary education
- Secondary education
- Higher (university and non-university education)

Pre-primary education is not widespread but is expanding.

Primary education is compulsory. It lasts six years starting at the age of 5½.

At the secondary level there are three branches:

- Secondary general
- Technical
- Vocational

Primary school graduates may enrol in secondary general if they pass the entrance examinations*.

Secondary general, which lasts six years, is divided into two cycles of three years each*. Only graduates of the second cycle of the secondary general are eligible to take the university entrance examinations.

In the technical field, there are three levels: lower, middle and higher. Holders of primary education certificates are entitled to enrol in lower technical education which lasts for three years.

Enrolment at a middle technical school requires graduation from either the first cycle of secondary general or from a lower technical school. Middle technical education also lasts three years.

Entrance to higher non-university institutions where the length of study is three years, is based on entrance examinations open to all graduates of secondary general and middle technical education.

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* Compulsory education has been extended to nine years, to include the first cycle of secondary education. There is therefore no entrance examination for the first cycle of secondary. Students now take an examination for entrance to the second cycle of secondary.

Vocational education offers mainly practical training in various fields and exists at all three educational levels. The period of training may be, in some cases, a few months, in others, as much as seven years. The educational entrance requirements for enrolling in a vocational school vary from a primary school certificate to a secondary school one.

University education (including teacher colleges) requires a secondary general school certificate and students must pass the entrance examinations. It lasts from two years (teacher training) to six years (medical faculties).

Figure 1 summarizes the preceding description.

2.2 Administration

All educational activities, with the exception of some vocational schools, are directly or indirectly the responsibility of the Ministry of Education.

The Minister of Education who is responsible to the Ministerial Council for educational matters exercises general supervision and decides, directly or indirectly, on educational policies. At the Ministerial level he is assisted by one or two vice-ministers as well as by the Higher Educational Council*, which constitutes the highest collective body for educational matters.

The Ministry of Education is structured in General Directorates which are responsible for the management of the various levels of education. There are three such General Directorates: for general education, including both primary and secondary education; for technical education and for higher education. According to the Greek Constitution, all institutions of higher education are legal public entities and are administratively autonomous. The Ministry of Education, however, exercises some control over these institutions through a government representative**.

Apart from the General Directorates, there are also some independent directorates such as the Directorate of Investment Planning and Operation Research.

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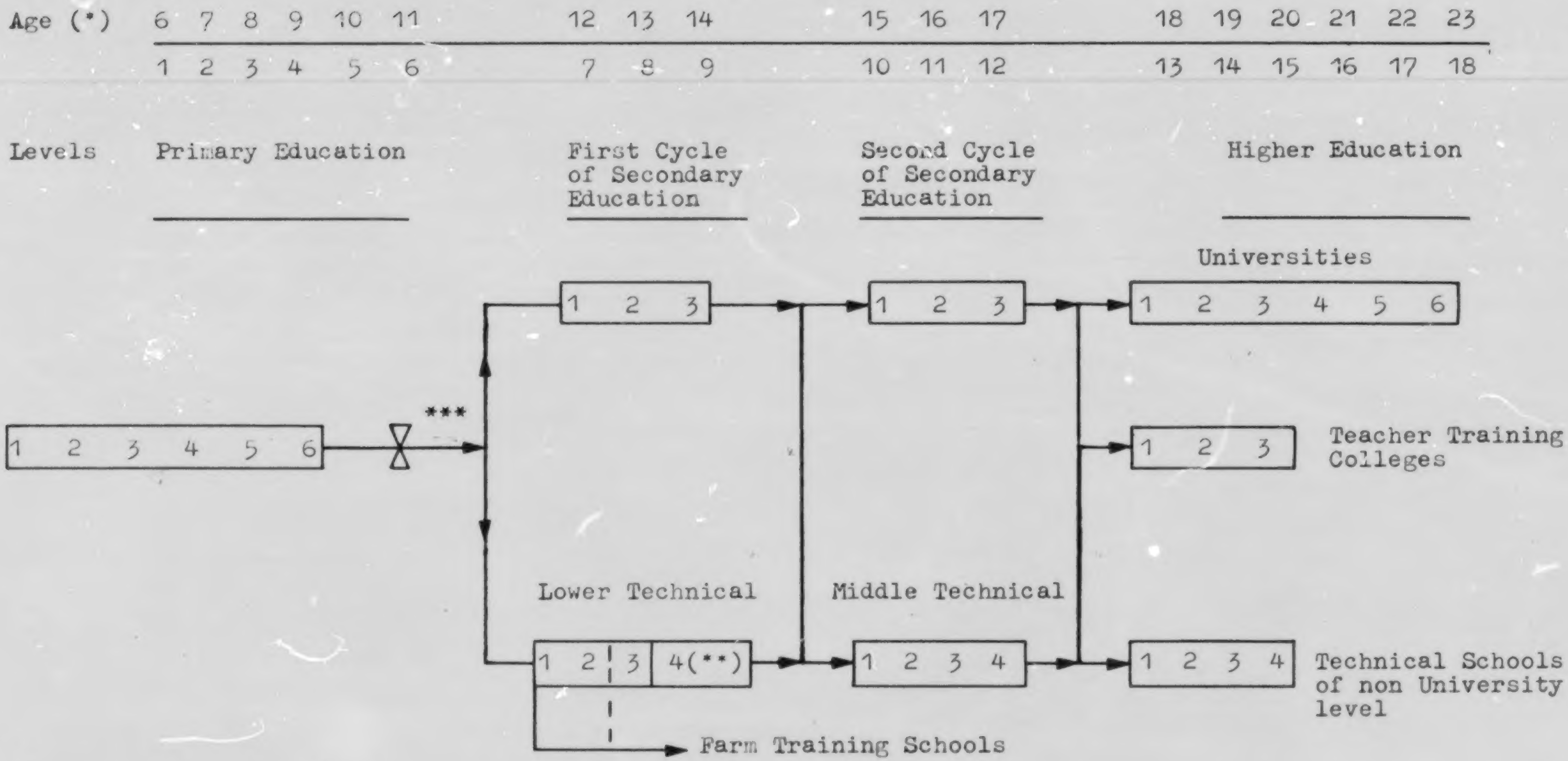
* This Council has been abolished recently and its functions transferred to the Centre for Educational Studies and Formation, to be established shortly.

** This system of government control has been abolished.

FIGURE 1

THE PRESENT STRUCTURE OF THE EDUCATIONAL SYSTEM


Age (*) 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Levels
Primary Education
First Cycle of Secondary Education
Second Cycle of Secondary Education
Higher Education
Universities
1 2 3 4 5 6
***
1 2 3
1 2 3
1 2 3 4 5 6
Teacher Training Colleges
1 2 3
Lower Technical
Middle Technical
1 2 3 4(**)
1 2 3 4
1 2 3 4
Technical Schools of non University level
Farm Training Schools

(*) Legal age of entrance is 5.5

(**) The 4th year applies only in the case of night schools.

(***) According to a 1976 Decree, compulsory education has been extended to nine years to include the first cycle of secondary education . There is therefore no entrance examination for the first cycle of secondary. Students now take an examination for entrance to the second cycle of secondary.

Diagram 1 shows a general organisational chart of the Ministry of Education.

At the regional level the educational system is organised administratively as follows.

There are 176 educational regions for primary education and 47 regions for secondary education. Each one is headed by an inspector.

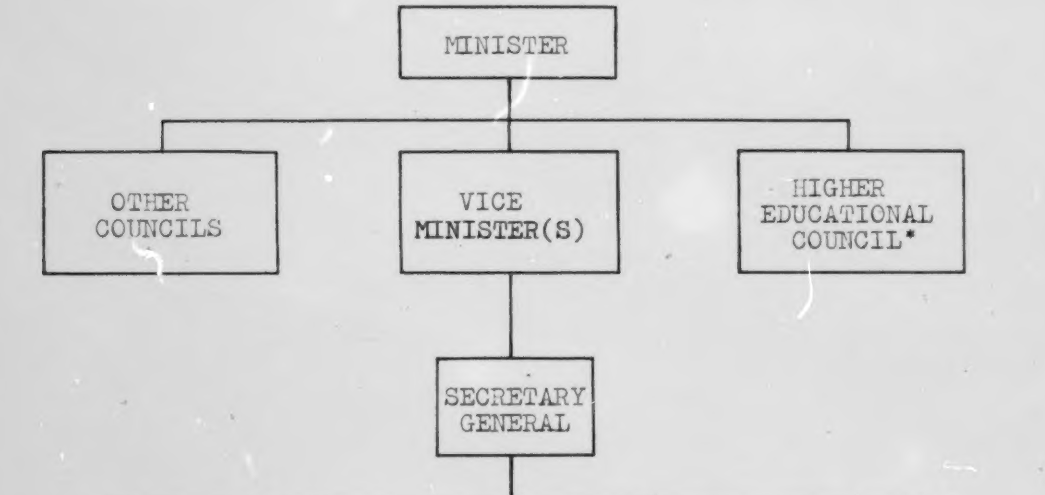
Several regions have general inspectorates of both primary and secondary education. The general inspectorates, in turn, make up 10 greater educational regions, each one headed by an educational counsellor who is in charge of the co-ordination and control of all the educational inspectors of his region.

For technical and vocational education there are 14 educational regions. Each is headed by an inspector of technical education who is under the supervision of one of the 10 educational counsellors.

Diagram 2 presents, in a general form, the organisational chart of the inspectorates.

DIAGRAM 1

ORGANISATIONAL CHART
OF
MINISTRY OF EDUCATION AND RELIGION


MINISTER
OTHER COUNCILS
VICE MINISTER(S)
HIGHER EDUCATIONAL COUNCIL*
SECRETARY GENERAL
GEN. DIRECTORATE OF RELIGION
GEN. DIRECTORATE OF HIGHER EDUCATION
GEN. DIRECTORATE OF GENERAL EDUCATION
GEN. DIRECTORATE OF PROFESSIONAL EDUCATION
DIRECTORATE OF ATHLETICS
DIRECTORATE OF GREEK SCHOOLS ABROAD
DIRECTORATE OF TECHNICAL SERVICES
DIRECTORATE OF INVESTMENT PLANNING AND O.R.
DIRECTORATE OF PERSONNEL ADMINISTRATION

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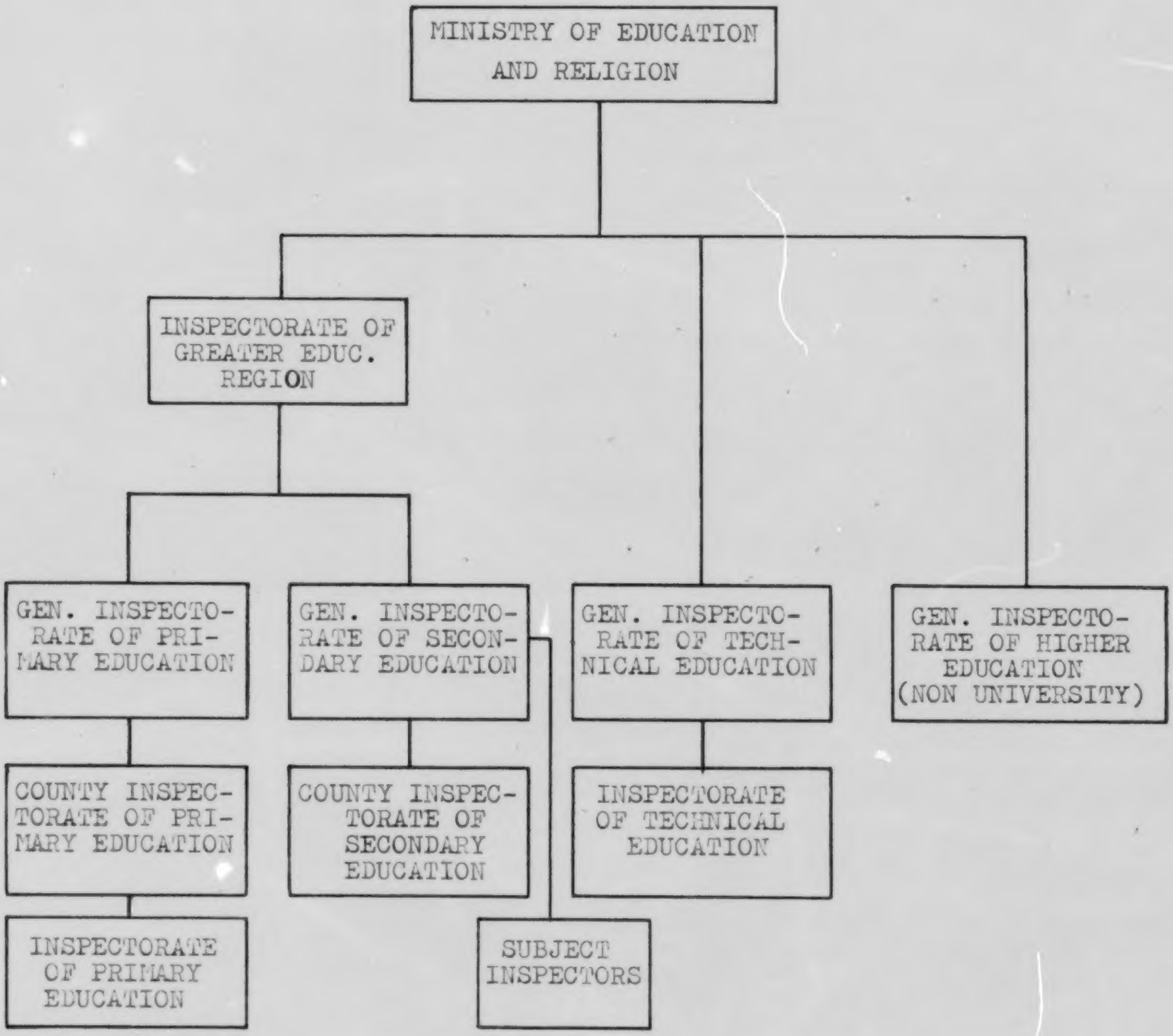
* This Council has been abolished.

DIAGRAM 2

ORGANISATION CHART OF EDUCATIONAL INSPECTORATES


MINISTRY OF EDUCATION AND RELIGION
INSPECTORATE OF GREATER EDUC. REGION
GEN. INSPECTORATE OF PRIMARY EDUCATION
GEN. INSPECTORATE OF SECONDARY EDUCATION
GEN. INSPECTORATE OF TECHNICAL EDUCATION
GEN. INSPECTORATE OF HIGHER EDUCATION (NON UNIVERSITY)
COUNTY INSPECTORATE OF PRIMARY EDUCATION
COUNTY INSPECTORATE OF SECONDARY EDUCATION
INSPECTORATE OF TECHNICAL EDUCATION
INSPECTORATE OF PRIMARY EDUCATION
SUBJECT INSPECTORS

CHAPTER 3

THE GOAL-SETTING SUB-SYSTEM

3.1 Introduction

There is a basic assumption which concerns the purposefulness of the educational system underlying the Greek Project. An educational system, like any other social system, is a purposive one. Its main intent can be stated in general terms as being to satisfy the educational needs of all the social systems of a society - including its own - as well as those of the individuals in the society. The educational needs of the various social systems may differ and the educational needs of individuals are not necessarily compatible with those of the social systems to which they belong and/or with the society as a whole.

In order to fulfil its purpose. the educational system must therefore be informed of the educational needs of those concerned and set the specific goals to be attained by the educational system accordingly.

It is evident that if the educational system is to be continuously informed of the educational needs, generated by other systems, there must be effective communication between the educational system and its clients.

Moreover, in order to be effective, an educational system must be responsive to its clients' demands. Responsiveness in the context of this study means that the educational system sets its goals in accordance with these demands.

The formulation and constant revision of goals in education implies the existence of a sub-system: the goal-setting sub-system. This sub-system includes all those inside, and some outside the educational system, who are responsible for the system's goal-setting. The nature of this system usually depends on the socio-cultural and political conditions prevailing at a particular period of time. The educational system itself however may have a greater or less time-lag in its response to environmental conditions.

3.2 The Goal-Setting Sub-System of the Greek Educational System

An attempt was made to identify, describe and critically examine the Goal-Setting Sub-System of the Greek educational system.

Following an implicit communication theory model, the work was formulated as follows:-

(a) Some of the most important social systems were identified. The social systems were defined according to the investigators' judgement. Although this may sound arbitrary, it proved very helpful in meeting one of the goals of the study.

(b) An attempt was made to identify the "formal" communication networks which exist between the educational system and each of the social systems under investigation.

The study confined itself to formal communication for practical reasons and these chosen limits should not be seen as an underestimation of the role of informal communication networks. It is indeed suggested that, where the study fails to detect the existence of a formal communication network, the reader should suspect the existence of some type of informal communications since communication seems constantly to take place. Informal communication takes place even where formal communication channels exist. The establishment of formal communication networks is however important because - although they may discourage the explicit and precise formulation of demands - they improve the system's "memory" and contribute to its continuous development.

(c) The internal policy/decision-making process was, in turn, examined from a strictly operational point of view. In other words, the mechanisms of policy-making were studied. The problem of whether actual policies were in accordance with expressed demands was not dealt with. The assumption here is that unless the system possesses the necessary internal mechanisms to enable it to receive information from all the social systems and to process this information with a view to producing a balanced set of goals within the prevailing set of constraints (financial, technical, etc.), the probabilities that the system's policies will be right all the time are very low.

.3 The Social Systems and their Communication with the Educational System

The social systems which were considered in the study are the ollowing:

- Religious
- Cultural
- National-Political
- Professional
- National Defence
- Demographic
- Economic
- International Educational
- Governance

The above social systems make up the "environment" of the educational system. The "individuals" were treated either as elements of the educational system (students-parents-teachers) or as elements of other social systems (e.g. demographic, professional, etc.) when they are not directly associated with the educational system.

For practical purposes, the social systems were defined in a way that would enable the agencies responsible for the educational concerns of each social system to be identified together with the existing formal communication network between the various social systems and the educational one.

3.3.1 The Religious System

The religious system is the social system responsible for teaching the Greek Orthodox faith; teaching religious principles; helping members of society to learn moral values and, in general, familiarizing individuals with religion.

To meet the above goals, the religious system undertakes certain appropriate educational activities with or without the direct collaboration of the educational system.

Activities undertaken by the educational system on behalf of and/or in collaboration with the religious one are:

- Organisation and operation of church schools which train minor clergy.
- Organisation and operation of theology faculties in universities for the higher education of church personnel.
- Teaching of religious subjects in primary and secondary schools.
- Designing of the necessary textbooks for religious subjects.
- Helping in the organisation and operation of religious activities intended for pupils at various educational levels.

The agencies of the religious system responsible for the educational requirements of the system are the following:

- The Standing Synodic Commission - concerned with the influence of textbooks in relation to the Christian Orthodox dogma.
- The Office of Christian Training - concerned with the qualitative improvement of Christian training in the schools. It also aids and directs the students' Christian organisations.

- Apostolic Deaconship and other Brotherhoods of Theologists - responsible for all publications on religious matters and for the organisation and operation of Sunday Schools, pupils' Christian groups, etc.

The above agencies communicate with the educational system in the following way:

The Standing Synodic Commission examines and expresses its opinion on religious textbooks for schools. The books are sent to the Commission by the Ministry of Education*.

The other agencies are in constant co-operation with the Ministry of Education since they frequently request direct support and assistance.

The procedure is that requests are submitted in the form of reports, suggestions and/or direct personal contact. They are usually submitted directly to the office of the Minister of Education. The agencies within the Ministry of Education which process the various requests from the religious system are.

- General Directorate of Religion - responsible for the co-ordination of governmental policies which concern the goals of the church.
- General Directorate of General Education - responsible for matters concerning the type and duration of religious instruction in primary and secondary education; the organisation and operation of middle and lower ecclesiastical schools; the textbooks in use; appropriate staffing of primary and secondary schools and their supervision as regards religious instructions, etc.
- General Directorate of Higher Education - responsible for all educational matters concerning university schools of theology.

Regardless of the specific entrance point, requests from the religious system are processed by the above agencies which, in turn, make official recommendations to the Minister to help him in reaching a final decision.

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* The Ministry of Education is also responsible for ecclesiastical affairs and, therefore, has the title: Ministry of Education and Religion.

3.3.2 The Cultural System

The cultural system, for the purpose of this study, is held to be the social system responsible for all cultural and spiritual development of the members of society other than that provided by the formal school system.

Although the cultural system may be responsible in itself, there is, or should be, a close co-operation with the educational system if their actions are to be co-ordinated and their aims compatible.

The responsibilities of the cultural system are dispersed over a large number of agencies, public or private. For practical reasons, the study confined itself to those agencies of a public or semi-public nature, or in other words, the "formal" cultural system. From this point of view, the study is incomplete in that it leaves out of the discussion all private organisations such as theatres, etc., as well as all regional and local non-profit-making organisations involved in cultural activities. Some of these omissions may be corrected if it is assumed that none of these agencies express their demands directly to the educational system but go through the Ministry of Culture and Science which is responsible for all cultural activities. It was indeed found that their direct communication with the educational system is very limited. Apart from the Ministry of Culture and Science, the following agencies have been covered more systematically:

- Academy of Athens
- Archeological Society
- National Research Institute
- Organisation of Greek State Theatres
- General Secretariat of Athletics
- Hellenic Handicrafts National Organisation.

3.3.2.1 The Ministry of Culture and Science

As was mentioned above, the M.C.S. is responsible for supporting and promoting scientific and cultural activities.

General policy questions are dealt with at Ministerial level. In the case of more specific questions the agencies of the M.C.S. apply directly to the relevant agencies of the M.E., namely:

- Higher Educational Council
- General Directorate of Higher Education
- Higher Educational Institutes.

After examining the requests, these agencies submit their suggestions to the Minister for his approval.

It was found that in spite of the broad spectrum of common interest between the two Ministries, there is no structured network of communication.

3.3.2.2 The Academy of Athens has as its main objective the support and promotion of science, literature and the arts. Communication with the M.E. is of an ad hoc nature. If there is a request, it is submitted directly to the Minister of Education through the President of the Academy.

3.3.2.3 The Archeological Society has as its main objective the study of ancient Greek civilization through the discovery and preservation of various ancient works. It was found that there is no direct communication with the M.E.

3.3.2.4 The National Research Institute supports the development of science through research. It seems that there is not much communication between the Institute and the M.E. The Institute works independently and communicates directly with the "researchers", individuals and/or public or private academic or scientific institutions.

3.3.2.5 The Organisation of Greek State Theatres* is responsible for the operation of various state theatres and their respective schools of drama. The organisation does not seem to have any direct communication with the M.E. nor with other parts of the E.S.

3.3.2.6 The General Secretariat of Athletism and Youth was established to help the development of extra-curricular athletics for young people. It helps the Ministry of Education to draw up programmes for athletics in schools. School athletics are the direct responsibility of the Directorate of Physical Training in the M.E. This Directorate is the agency which communicates with and handles the requests of the G.S.A.Y.

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* This organisation has been abolished.

3.3.2.7 The Hellenic Handicrafts National Organisation has as one of its goals the promotion and development of Greek popular arts. It supports exhibitions, training, competitions, etc. The organisation has no direct communication with the M.E.

3.3.3 The National Political System

This is one of the most difficult social systems to define. In this study, it was defined as the social system responsible for those activities which concern the development of a national consciousness in individuals. It is obvious that this general objective of the national political system is shared by many other social systems such as the cultural, the national defence, the religious, and, of course, the educational system. On behalf of the national political system, the educational system informs pupils about the goals and pursuits of the nation; the historic significance of the nation and its role within international society, the political concepts valued at any period of time, etc..with a view to developing and strengthening the pupils' faith in the nation as well as their political consciousness.

Some of the component parts of the national political system which can be identified are:

- Ministry of National Defence
- Academy of Athens and similar institutes
- Government press and information office
- Various political parties and/or political organisations
- Other organisations, societies, unions, etc., national, regional, or local with some activities of a national political nature.

There is no apparent systematic communication between the M.E. and the above parts of the N.P.S. Their requests are submitted directly to the offices of the Minister of Education. It may also be added that national political aims are indirectly pursued through a broader value system which is shared by members of the educational system*.

3.3.4 The Professional System

The professional system is made up of all organised groups of professionals, each one having as its main purpose the protection and advancement of the professional rights of its members. To attain their objectives, various groups (or sub-systems) of the professional system exercise their influence on the educational system in the following areas:

- Quantitative expansion of various levels of the educational system
- Professional rights of graduates of the various levels and parts of the educational system
- Equivalence of the diplomas granted by the various faculties
- Organisation of post-graduate training
- Recognition of new specialities
- Introduction of new subjects into the curricula
- Modernization of the curricula, etc.

These areas are clearly of considerable importance for the educational system, but even so the flow of requests from the various groups to the educational system is not systematically regulated. Principally this is due to bad organisation on the part of the various professional subsystems which do not have the appropriate mechanisms and to the fact that the responsible agencies of the educational system are not particularly efficient here.

Requests from the professional system are put forward either through occasional visits to the Ministry of Education or through other ministries, and in particular, the Ministry of Planning**.

The units within the E.S. responsible for receiving and processing such requests are the following:

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* For a discussion on how overall cultural and/or sub-cultural value systems operate see, for example: G. Vickers, Value Systems and Social Process, Pelican paperback, 1970; C. Soumelis, "Planning Decision and Control in Social Systems" in J. Rose (ed.), Advances in Cybernetics and Systems, Gordon and Breach Ltd., London, 1973.

** Now the Ministry of Co-ordination.

- Ministry of Education and particularly:
    - Minister's Office
    - Directorate for Investment Planning and O.R.
    - General Directorate for Higher Education
    - General Directorate for Technical and Vocational Education
- Institutions of Higher Education.

All proposals of the above agencies are submitted to the Minister of Education for final approval.

3.3.5 The National Defence System

The national defence system is defined here as the social system accountable for all activities concerning national defence. This system is self-contained where certain of the educational and training activities for its members are concerned. However, in many instances, it has to make use of the formal educational system to supplement its own activities. Furthermore, the national defence system also shows an interest in the set of values adopted by the educational system at any given period of time.

Where formal education and training are concerned, the national defence system co-operates with the educational system in the following areas:

- Elementary education to reduce illiteracy among its personnel;
- Formal professional education and training, at secondary and tertiary levels, for certain categories of personnel;
- Post-graduate education and training at home and abroad;
- Recognition of the equivalent value of diplomas of technical schools of the defence system and those delivered by the educational system;

The national defence system makes requests to the educational system mainly through its following agents:

- Basic or special training centres.
- Bigger or smaller military units.
- Technical schools.
- Schools of higher technical education.
- Central staff office.

The above units communicate with the educational system by means of an exchange of documents, official contacts, visits, inspections, conventions, etc.

Agencies of the educational system which are most frequently in communication with the respective agencies of the defence system are:

- Ministry of Education and particularly:
  - Minister's Office
  - General Directorate of Higher Education
  - General Directorate of General Education

- Educational institutions in general and particularly:
  - Institutions of higher education
  - Technical schools
  - Private schools

- Regional administrative agencies
  - Inspectorates of the various educational levels
  - Other regional agencies of the educational system

The methods followed for elaborating the requests received are similar to those described for the Professional system.

3.3.6 The Demographic System

The demographic system in the context of this study is considered to be the entire population of the country viewed in terms of such characteristics as regional distribution, age, sex, mobility, etc.

The demographic system exercises pressures which can be interpreted as demands upon the educational system. These demands or pressures are the inevitable result of demographic changes. For example, a change in the population growth rate will automatically have an effect upon the educational system at the initial entrance point (i.e. first year of compulsory education). Changes in regional distribution of the population and/or in the sex ratio (i.e. number of boys in relation to number of girls) will also result in pressure upon the educational system. For the educational system to be able to develop smoothly, it must be informed of expected demographic changes.

The following are some of the most important agencies in charge of the systematic study of developments in the demographic system:

- National Statistical Service (N.S.S.)
- Centre for Social Research
- Centre for Demographic Studies, Medical School and University of Athens

The findings of the N.S.S. are printed regularly and sent to the Ministry of Education and/or other parts of the educational system. The findings of the other two agencies, however, are not systematically forwarded to the M.E.

In the educational system it is the Ministry which is most concerned with receiving and processing information on developments in the demographic system. Units of the M.E. more particularly responsible for this job are the following:

- Directorate of Investment Planning and O.R.
- General Directorate of Higher Education
- General Directorate of General Education
- General Directorate of Technical and Vocational Education

The analysis of demographic information affects the setting of goals in the following activities:

- General distribution of educational services all over the country.

- Establishment and location of new school buildings and/or the expansion of existing ones.

- Estimating the number of teaching personnel.

3.3.7 The Economic System

The economic system is defined here as the social system responsible for the production of the necessary goods and services required by society at large*. It is made up of all entities, private and/or public, engaged in the production of goods and/or services. The effective and efficient functioning of the economic system presupposes, inter alia, the availability of the necessary qualified manpower as well as an appropriate "technology". For these two indispensable inputs the economic system depends on the educational system.

The specific educational needs of the economic system at any period of time are a function of its state of development, as well as of its growth targets. More particularly, they usually take the form of demands which concern:

- Numbers of qualified manpower by type, this may affect the growth of various parts of the educational system.
- "Quality" of the manpower produced; this affects the curricula, the teaching staff system, etc.
- New specialities; this affects the expansion of the educational system.
- Development of appropriate technology; this affects the research activities of the educational system**.

These demands are formulated by agencies such as:

- National Statistical Service
- Centre for Planning and Economic Research
- Ministry of Social Services
- Ministry of Labour and various labour employment organisations
- Ministry of Planning and that of National Economy***.

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* If the educational system is seen as a service-producing industry, it can then become a sub-system of the economic system.

** Not all educational systems are necessarily engaged in research themselves.

*** These two Ministries have been replaced by the Ministry of Co-ordination and the "productive" Ministries (i.e. Industry, Agriculture, Commerce).

- Federation of Industrialists
- Various professional organisations

The educational system is informed of the demands either through various publications and/or by direct participation in the joint working groups and committees in charge of the relevant investigations and research work.

The Greek educational system has not up to now given very high priority to the research goal. However, the demands for more research from both inside and outside the system have been increasing over the last years.

In the educational system the units responsible for receiving and elaborating the economic system's demands are:

- Ministry of Education and particularly:
  - Directorate of Investment Planning and O.R.
  - General Directorates of Higher, Technical and Vocational Education
- Institutions of higher education

3.3.8 The International Educational System

The international educational system (IES) is made up of all national and international agencies dealing with educational matters. To simplify the discussion, the IES for the Greek educational system can be limited to the educational systems of some European countries such as Germany, France, Italy, England, together with the U.S., as well as some international organisations with important educational activities, such as UNESCO, OECD, etc.

The influence exercised by the IES upon the Greek educational system may take several forms such as:

- Transmission of knowledge and ideas through Greeks who return to Greece after study abroad and re-enter the Greek educational system as university professors, researchers, public administrators (e.g. the Ministry of Education), etc.

- Direct transfer of knowledge through foreign professors who are invited to Greece to teach, undertake research and/or advise on educational activities (e.g. the University of California is directly involved in the development of the new Centres for Higher Technical Education: K.A.T.E.) or other types of activities.

- Influence on the value systems underlying the broader goals of the educational system, through international meetings where Greek civil servants and/or other members of the Greek educational system participate (e.g. Greek students participating in international student conferences). The gradual adoption by the Greek educational system of goals such as "equality of opportunity" may be attributed, to a large extent, to the influence of international organisations such as the OECD and UNESCO.

Channels of communication between the Greek educational system and the IES are both formal and informal. Communication with the international organisations of which Greece is a Member country is usually formal. Greek delegations are in charge of informing the Greek Government and, in turn, the appropriate elements of the educational system (especially the M.E.) on the educational activities of these organisations.

The institutions of higher education communicate either independently as institutions (e.g. the OECD/CERI project on University Management) or through those of their members who are in contact with similar institutions in other countries. Their members also participate, formally or informally, in various international educational conferences.

A great deal of informal communication also takes place among the members of the Greek educational system as well as the general public through literature on international education. Although tracing this type of communication is not easy, it is important especially from the point of view of its effect on the prevailing value systems which underlie the educational goals in Greece.

3.3.9 The Governance System

The governance system, in the context of this study, is the social system responsible for the satisfaction of the educational needs of society as a whole. It is made up of all agencies of an executive, legislative and judiciary responsibility.

It is evident that the Ministry of Education, apart from being a sub-system of the educational system, also belongs to the governance system and more particularly to its "executive" sub-system. The importance of the "executive" sub-system and, in turn, of the Ministry of Education depends on the prevailing socio-political structures.

In Greece, these are of great importance since a major part of the educational system is run by the State.

The sectors of the governance system concerned with educational activities and in communication with the educational system, especially through the Ministry of Education are:

- President's Office
- Ministerial Council
- Ministries of Planning and Finance
- Various legislative bodies (e.g. the Parliament)
- Administrative High Court

Communication usually takes place at the ministerial level. Units for elaborating demands from the governance system within the Ministry of Education are the following:

- National Board of Education
- Higher Board of Education
- General Directorates
- Directorate of Investment Planning and O.R.
- Ad hoc committees established for the study of particular subjects

3.3.10 The Educational System

The educational system should be informed of its own educational needs as well as those of other social systems. It is, therefore, necessary to study the educational system with a view to identifying the ways and means by which it is able to become aware of its own needs.

The educational system as defined here is the formal one which is more or less under the direct responsibility of the Ministry of Education. The autonomy (i.e. the freedom of setting and/or changing its own goals) of the various parts of the system is very limited. The institutions of higher education have somewhat more autonomy. The private sector of the educational system, which accounts for only a small part of the total, enjoys relatively higher autonomy, although it has to follow the general directions set for the public sector and is also under governmental supervision. There are no private universities whose diplomas are officially recognized.

Some of the needs of the educational system and their effects are:

- Educational research; a qualitative and quantitative (increase of productivity) effect;
- Manpower demand; a quantitative and qualitative effect;
- Demand for physical facilities (including building equipment, etc.);
- Demand for changes in the value system, the structural arrangements, methods of management, etc.

The origins of these demands are difficult to identify and isolate for each case.

The following may be considered as some of the main sources of demands:

- Inside the educational system:
  - Pupils and students at all levels through their organisations;
  - Teachers at all levels through their professional organisations* and/or as individuals;
  - Inspectors and supervisors at all levels through their evaluative reports;

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* The teachers' unions are also part of the professional system.

- School trustees at all levels;
- Heads of schools at all levels through their reports;
- Educational research institutes (e.g. faculties of education in the universities, experimental schools, etc.).
- **The Ministry of Education and particularly:**
    - **Higher Educational Council**
    - **Directorate of Planning Investment and O.R.**
    - **General Directorates**
    - **Various *ad hoc* committees operating in the M.E.**

- Outside the educational system:
    - Parents' Associations
    - International Educational System
    - Professional System
    - Governance System
    - Various research organisations

In the Greek educational system, the agency responsible for considering the needs expressed by the educational system is, of course, the Ministry of Education.

The channels of communication between the M.E. and the abovementioned sources of information on the educational system's needs are not always easy to identify. Only the formal bodies of the Ministry of Education and/or the components of the governance system have more or less defined channels of communication. All the other elements, such as the students' and teachers' organisations, the educational research institutes, etc., have informal *ad hoc* communication which means that the educational system is not sufficiently informed about their real needs.

Parts of the educational system which receive and elaborate information about the system's needs are the following:

- National Board of Education
- Higher Educational Council
- General Directorates
- Directorate for Planning Investment and O.R.

Proposals for satisfying the needs of the educational system are sent to the Ministry of Education for approval.

CHAPTER 4

FINDINGS AND CONCLUSIONS

4.1 The main findings of the study pertaining to the goal-setting subsystem could be summarized as follows:

Greek educational system as a whole does not seem to be adequately equipped to respond efficiently to the demands of the various social systems and of individuals. This is shown not only from the investigation of the system's communication set-up but also from the profound mismatch which exists between societal educational demands (in terms of manpower, research, new technology, new ideas and values) and actual output of the educational system.

The survey showed that this is principally because the system is not sufficiently informed at any given period of time of the continuously changing societal educational demands and because the inherent rigidity of the system does not allow it to adapt to changing environmental conditions. In other words, the goals of the educational system are set without due regard to the educational demands of various social systems. They are set on the basis of what can only be described as arbitrary criteria which express either the value systems of those at the top of the executive pyramid or the educational demands of only a few of the social systems, depending on the political power structure at any given period of time.

Taking into account the relatively centralized structure of the Greek educational system, the main responsibility for overcoming these shortcomings falls on the Ministry of Education, and particularly with regard to the following areas:

- The establishment of a systematic communication with all those interested and/or affected by the educational system's activities. In cases where such communication is not feasible, the Ministry of Education would need to make special efforts to be informed of societal demands, for example through "marketing" surveys*. The Ministry of Education lacks, however, the necessary capacity for such work at present, and the existing structure does not permit the systematic and scientific elaboration of the information received about various demands which is necessary for a responsive goal-setting process.

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* Such a "marketing" type of study is being undertaken by the O.E.C.D. in collaboration with the Greek National Centre for Social Research for estimating the demand for post-secondary education in Greece.

- The encouragement of basic educational research and development work which could have an innovating effect upon the educational system.

- The systematic gathering and processing of information on developments within the international educational system. It should be noted that, on the contrary, the behaviour of the Greek educational system vis-a-vis its international environment has always been conservative and one could say that educational developments outside the national sphere have been looked upon with suspicion and fear. This has contributed to the sluggishness of the system in adapting itself to actual socio-economic changes, whereas ideally, the educational system should not merely adapt but take the lead in necessary social change; i.e. become an agent of change.

This was also shown in the historical study of some examples of goal-setting which was undertaken within the framework of this study. The main findings of this work which appear in more detail in Appendix A of the principal study show that the introduction of new ideas into the Greek educational system has almost always been the result of private initiative. The adoption of these ideas by the public system has always been done a posteriori, with a significant time-lag between private initiatives and adoption of the idea by the State.

It is evident, therefore, that the public educational system lacks innovative capacity. This not only prevents it from playing a leading role but also from responding quickly to private innovative initiatives, so that it is only when things reach a critical state that the public system responds by adopting a new idea.

4.2 Proposals

In the light of the findings outlined above proposals and initiatives for changes would need to be sought in the following areas:

- Improvement in the capacity of the educational system to communicate with other social systems.

- Improvement in the capacity of the system to elaborate information received and use it in the setting of the system's goals.

- Improvement in the system's capacity for self-scrutiny with a view to increasing awareness of its own behaviour.
- Support for educational research and development and the utilisation of the results.
- Expose the system to international developments by opening it up as much as possible.
- Forcefully encourage various educational sub-systems to learn to participate constructively in educational matters and allow them to influence policy/decision-making.

CHAPTER 5

THE DECISION-MAKING SUB-SYSTEM

5.1 As was mentioned in the Introductory part of this report, the *Decision-Making Sub-System* is the social system responsible for those decisions which dictate the way in which the means for achieving the system's objectives are transformed into concrete actions.

These "decisions" differ from those which relate to the setting of objectives (policy decisions) in that they are taken within a more or less pre-determined decision-making frame and are subject to pre-defined constraints such as administrative rules, legislation, etc., which are also the result of policy decisions.

Policy decisions on the selection of the system's objectives are less constrained. In other words, the "decision-making sub-system" has a lesser degree of freedom than the "goal-setting sub-system"*. However, from the point of view of the decision-making processes involved in each sub-system there is very little difference. In both cases the process follows the steps shown in Diagram 3**.

The input as well as the output of the decision-making system is information, and the real nature of the deciding function is the processing of information. The crucial characteristics, therefore, which the "*decider*" has to take into account are:

- Amount and nature of the input information (goals, constraints, etc.).
- Criteria available for evaluating the "decision".
- Nature of the process (techniques and means for evaluating the possible alternatives open before the ultimate decision).
- Amount and nature of the information on the eventual and/or actual results of any decision (feedback).
- Time period within which a decision should be taken.
- Feedback time lag (i.e. the time period between the taking of a decision and selection of information on the decision's result).

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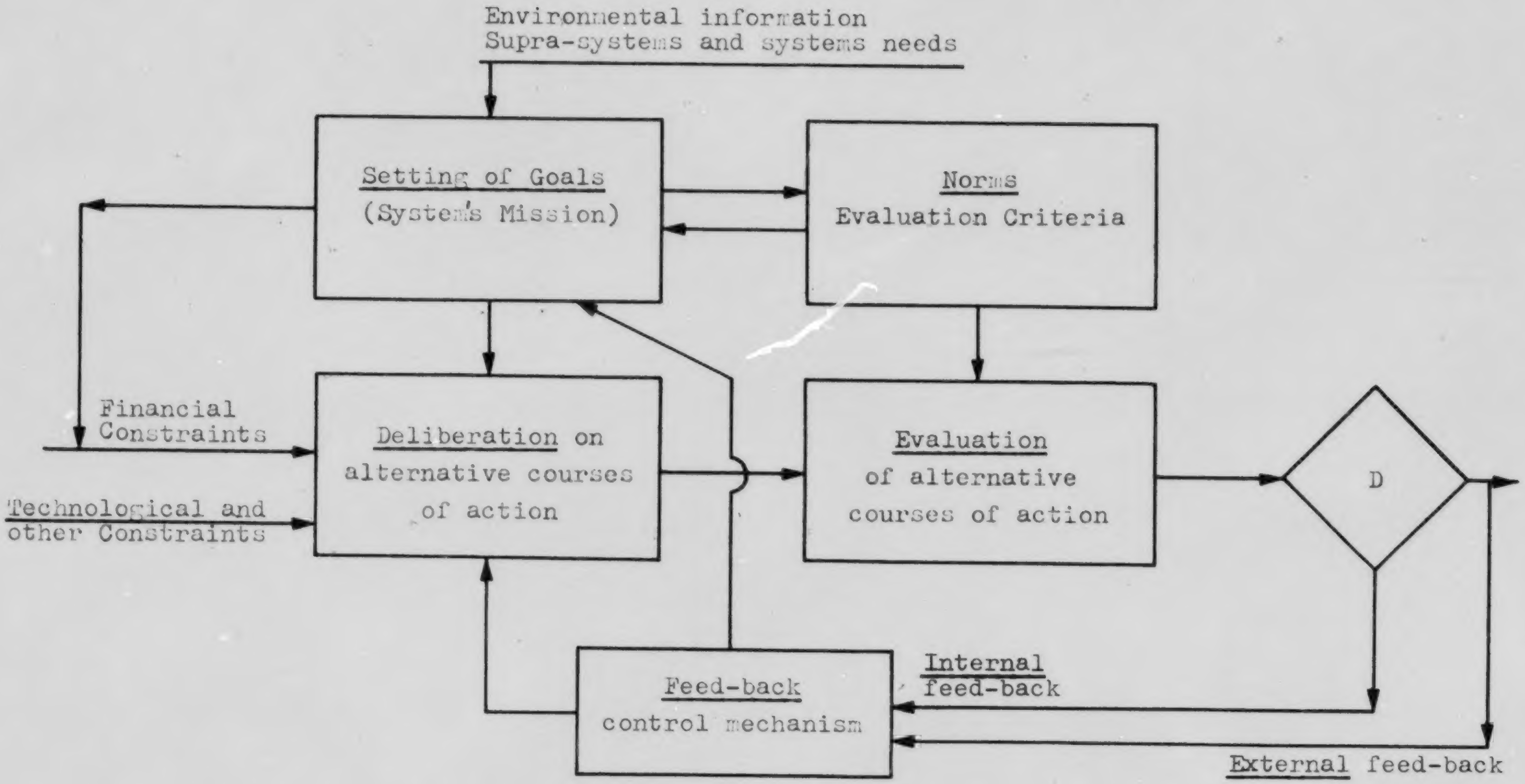
* For a discussion on the relative autonomy of various deciding systems, see C. Soumelis, "Planning, Decision and Control in Social Systems" in J. Rose (ed.), *Advances in Cybernetics and Systems*, Gordon and Breach Ltd., London, 1973.

** Because of the self-explanatory nature of the Diagram, any narrative is avoided here. For a detailed discussion see, C. Soumelis, *op. cit*.

DIAGRAM 3

THE DECIDING MODULE


Environmental information
Supra-systems and systems needs
Setting of Goals
(System's Mission)
Norms
Evaluation Criteria
Financial
Constraints
Technological and
other Constraints
Deliberation on
alternative courses
of action
Evaluation
of alternative
courses of action
D
Feed-back
control mechanism
Internal
feed-back
External feed-back

- Nature and type of the decision (i.e. what is the objective when taking a particular decision).
- Cost involved in taking a decision.
- Timespan of the decision's results.

All the above factors and more* can be used for evaluating the taking of a particular decision.

The analytical work was carried out in two dimensions: the organisational one in which organisation factors are taken into account and the functional one in which the particular decision activity is analyzed.

For the organisational analysis, flow charts of the decision-making process at any major decision point were developed. They showed all those involved in the taking of a decision (authority line), the framework within which a particular decision is taken (administrative rules, legislation, etc.) as well as the means and techniques used in taking a decision (how information is processed). Examples of such flow charts are shown in Appendix A.

The functional analysis which was carried out at the same time aimed at establishing the relative importance of the decisions with a view to facilitating an eventual redefinition of decision-making levels.

To determine the relative importance of a decision, the following criteria were employed:

- Type of decision
- Timespan of the effect of the decision
- Number of the system's elements which may be eventually affected by the decision.

For reasons of simplicity the evaluation was made on the basis of these three factors alone. It was generally felt that, within the framework of this study, use of these three crucial factors would allow some of the more serious deficiencies of the Greek educational decision-making system to be discerned and would clearly demonstrate the usefulness of such an analysis. For a more thorough study of the system, however, more factors could and should be used.

The basic aim in evaluating the relative importance of a decision is that of estimating the relative values (importance) of all the decisions involved in order to make an evaluation based on their respective total values.

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* See Appendix B

More specifically, if we take X, Y and Z as the values of the above three factors, the total value of a particular decision (i), D_i is given by the function:

$$D_i = f(X_i, Y_i, Z_i)$$

The basic problem to be solved is the establishment of scores for each criterion used and if possible all values should be given in the same units in order to facilitate subsequent comparison. For this study the three criteria were defined as follows:

5.1.1 Type of Decision: This criterion sets the relative value of a decision, taking account of its nature. It is evident that not all decisions contribute equally to the achievement of the system's objectives. The differenceof importance between a decision about the recruitment of a university professor and a decision concerning a leave of absence for a teacher is evident. Decisions may therefore be classified according to type.

It is clear that the classification will not be entirely objective, although objectivity can be increased by considering as many expert opinions as possible and establishing the mean values accordingly.

Table 1 shows the categories of decisions and the respective coefficients adopted for the study. It is hardly necessary to stress again that the list is no more than indicative.

The total value E_i, (or the contribution) of the factor: "type of decision" (X), of a particular decision (D_i), is equal to the product of its weighted coefficient C_{ki} (i.e. decision category k within which the particular decision (i) under evaluation) and the value of the type of the decision (i)X_i.

$$E_i = C_{ki}X_i$$

TABLE 1

Classification of Decisions and Weighted Coefficients

Decision Category		Coefficient
1.	Organisation-Planning-Administration of Education	5
2.	Operation of Education (Schedule-Curriculum-Time limits)	4
3.	Operation of Educational Administration-Councils	3
4.	Personnel-Means-Installations	2
5.	Miscellaneous	1

5.1.2 Timespan of the Decision's Effect: This general factor reflects the fact that the importance of a particular decision is related to the duration of its effect. For example, the duration of the effect of a decision about the building of a school or the recruitment of a professor is much longer than that of a decision about granting leave of absence to a professor. Briefly, it is necessary when evaluating the importance of a decision to establish a precise idea of the duration of its effect on the system.

Table 2 shows five possible time periods for decisions and their respective coefficients. Using the same formula as above, the total value T_i (or the contribution) of the factor: "duration of decision's effect" (Y), of a particular decision D_i is:

$$T_i = V_{ki} Y_i$$

where V_{ki} is the weighted coefficient taken from Table 2.

TABLE 2

Decision Categories and Weighted Coefficients

No.	Decision Category	Coefficients
1.	Decisions of 1 - 3 day duration	1
2.	" 1 - 10 " "	2
3.	" 1 - 2 year duration	3
4.	" 2 - 5 " "	4
5.	" > 6 " "	5

5.1.3 Decision's Effect on the System's Elements: This factor reflects the fact that the importance of a decision is also related to the number of elements within the system which it affects. In other words, the importance of a decision affecting only one pupil or one teacher is much less (from the system's point of view) than that of one which affects a hundred pupils or teachers.

The following are the main elements of the educational system by which the importance of a decision may be measured:

(1) Personnel

- Teachers
- Students
- Other

(2) Equipment - Installations

(3) Expenditures for putting the above into effect

The total value (L_i) (or the contribution) of the factor: "Decision's Effect on the System's Elements" (Z) of a particular decision (i) is a function of the above three elements, M, C^A, C^B, where M the contribution of Personnel (in personnel units), C^A of equipment-installation (in personnel units) and C^B the necessary expenditures (in personnel units). More precisely:

$$L_i = M_i + C^A{}_i + C^B{}_i$$

The estimation of M, C^A and C^B is given below.

5.1.3.1 Estimation of M

Generally speaking, personnel (P) can be distinguished according to type (e.g. teachers, pupils, etc.) and educational level (e.g. primary, secondary, etc.). If k indicates the type of personnel ($k = 1, 2, 3$ --n where n the total number of personnel types) and j indicates the educational levels ($j = 1, 2,$ -- 5, in our case) then:

$$M = \sum_{jk} m_{kj} \; P_{kj}$$

where m_{kj} is a coefficient to help standardize the personnel units in general to personnel elementary units. It is evident that this coefficient is complex in that it has to account for all possible transformations.

Considering only two types of personnel: teaching personnel and pupils-students (i.e. $k = 1, 2$) and the five educational levels ($j = 1, 2, 3, 4, 5$)

$$m_{kj} = B_{kj} \; R_{kj}$$

where B is the coefficient for the standardization of pupils-students ($k = 1$) and R the coefficient for standardizing the teaching personnel ($k = 2$).

Thus for k = 1: $m_{1j} = B_j$

and for k = 2: $m_{2j} = B_j R_j$

B_j is defined from the relation $B_j = \frac{\sum 1}{\sum j}$

where $\sum_1$ is the total number of pupils at the elementary level (j = 1) and $\sum_j$ is the total number of pupils-students elements at the level j we are concerned with at any time.

Table 3 gives the estimated values of B_j for the five educational levels in Greece by year of study.

5.1.3.2 Estimation of C^A

C^A is estimated from the relation: $C^A = \frac{e_1}{u_1}$ where:

e_1 = installation-equipment expenditure in local currency (for the decision at hand)
u_1 = installation-equipment unit cost (at the elementary level per pupil)

5.1.3.3 Estimation of C^B

C^B in turn is estimated in a similar way from the relation:

$$C^B = \frac{e_2}{u_2}$$ where:

e_2 = corresponding expenditure (for the decision at hand)
u_2 = corresponding unit cost (at the elementary level, per pupil)

Recapitulating, the importance (value) of a decision (D_i) is given from the relation:

$$D_i = E_i T_i L_i$$ (in elementary units) where:

$E_i = C_{ki} X_i$
$T_i = V_{ki} Y_i$
$L_i = M_i + C_i^A + C_i^B$

Using the above general formula an attempt was made to evaluate various decisions by level of education. The results are shown in Tables 6, 7 and 8.

TABLE 3

Estimation of B_j

Level j / k = 1	Elementary (j = 1)	Middle and Lower Tech (j = 2)	Secondary General (j = 3)	Higher Tech (j = 4)	Higher (j = 5)
$\sum_j$	950,000	34,000	450,000	11,000	90,000
B_j	1	28	2	86	10

R_j is defined from the relationship: $R_j = \frac{\sum_j}{T_j}$

where T_j the total number of teaching personnel by educational level (j). The estimated values of R_j are shown in Table 4.

TABLE 4

Estimation of R_j

j / k = 2	Elementary (j = 1)	Middle and Lower Tech (j = 2)	Secondary General (j = 3)	Higher Tech (j = 4)	Higher (j = 5)
$\sum_j$	950,000	34,000	450,000	11,000	90,000
T_j	28,000	700	13,000	150	1,200 (3,000)
R_j	34	50	35.	73	75(12)

From the combination of the above, the values for m_{kj} are shown in Table 5.

TABLE 5

Estimation of m_{kj}

j / k	j = 1	j = 2	j = 3	j = 4	j = 5
Students-pupils k = 1	1	28	2	86	10
Teaching pers. k = 2	34	1,400	70	6,278	750(120)

TABLE 6

Evaluation of Decisions on General Education

EVALUATION CRITERIA	Type of decision (E)		Duration (T)		Effect on the System (L)					Total (D_i)	Decision Maker
					Personnel		Total	Installation Equipment	Other Expenditure		
DECISION		Coef.		Coef.	Teaching Personnel	Students	(M)	(C^A)/10	(C^B)/10		
1. Establishment of Gymnasium	Organ.	5	6 yrs.	5	$\frac{12}{840}$	$\frac{360}{720}$	1,560	1,000	1,000	89,000	Minister
2. Duration of general education	"	5	6 yrs.	5	$\frac{13,000}{910,000}$	$\frac{450,000}{900,000}$	1,810,000	100,000	130,000	50,000,000	Ministerial Council
3. School year duration, general education	Opera.	4	1-2 yrs.	3	$\frac{13,000}{910,000}$	$\frac{450,000}{900,000}$	1,810,000	-	-	21,720,000	Minister
4. Curriculum of public education	"	4	1-2 yrs.	3	$\frac{28,000}{980,000}$	$\frac{950,000}{950,000}$	1,930,000	-	-	2,316,000	"
5. School excursion	"	3	0-30 days	1	$\frac{A}{140}$	$\frac{140}{140}$	280	-	-	840	School Director
6. Teacher appointment	Person.	2	6 yrs.	5	$\frac{1}{70}$	$\frac{30}{60}$	130	-	300	4,300	Minister
7. Promotion of teacher	"	2	2-5 yrs.	4	$\frac{1}{35}$	$\frac{20}{20}$	55	-	10,000	440	Minister

NOTE: C^A & C^B in thousands of Drs.
M in pupils of primary education
E & T dimensionless numbers

$D = E.T.L.$

$L = M + C^A + C^B$

TABLE 7

Evaluation of Decisions on Professional Education

EVALUATION CRITERIA / DECISION	Type of decision (E)		Duration (T)		Effect on the System (L)					Total	Decision Maker
					Personnel		Total	Installation equipment	Other expenditure		
		Coef.		Coef.	Teaching Personnel	Students	(M)	$(C^A)/10$	$(C^B)/10$	(D)	
1. Establishment of a school	Organ.	5	6	5	12/1,200	300/720	1,940	1,200	120	81,500	Minister
2. Qualifications setting of personnel	"	5	6	5	200/ 20,000	-	20,000	-	-	500,000	"
3. School year duration	Operat.	4	6	5	700/ 70,000	34,000/ 68,000	138,000	-	-	2,760,000	"
4. Constitution of School Building Organis. Council	"	3	2-5 yrs.	4	-	-	-	50,000	30	610,000	"
5. Determining curriculum	"	4	6	5	-	34,000/ 68,000	68,000	-	-	1,360,000	"
6. Determining entries to SELETE	Person.	2	2-5 yrs.	4	-	500/500	500	-	-	4,000	"
7. Appointing teacher in public school	"	2	6	3	1/500	30/210	710	-	350	10,600	"
8. Resignation of teaching personnel	"	2	1-10 mos.	2	1/100	30/60	160	-	100	1,040	"
9. Transfer from Institute to Institute	"	2	1-2 yrs.	3	-	10/70	70	-	-	420	Secretary General
10. Transfer of Inspectors	"	2	1-2 yrs	3	1+50/500 +500	2,430/ 4,860	5,360	-	1	62,160	Minister
11. Appointment of teaching personnel paid per hour	"	2	1-10 mos.	2	1/100	30/60	160	-	6	670	Prefect

NOTE: (C^A) & (C^B) in 000 drachmae
(M) in pupils of primary education
(E) & (T) dimensionless number.

$D = E.T.L.$

$L = M + C^A + C^B$

TABLE 8

Evaluation of Decisions on Higher Education

EVALUATION CRITERIA / DECISION	Type of decision (E)		Duration (T)		Effect on the System (L)					Total	Decision Maker
					Personnel		Total	Instal-lation Equip-ment	Other Expen-diture		
		Coef.	Yrs.	Coef.	Teaching Personnel	Students	(M)	$(C^A)/10$	$(C^B)/10$	(D)	
1. Establishing a chair	Organ.	3	6	5	1+9/1830	450/4500	6,330	1,000	1,200	112,950	Minister
2. Establishing Assistant's post	"	5	6	5	1/120	50/500	620	-	100	18,000	"
3. Election of Rector	"	3	2-5	4	-	-	-	-	-	12	"

NOTE: C^A & C^B in thousands of Drs.

M in pupils of primary education

E & T dimensionless numbers

$D = E.T.L.$

$L = M + C^A + C^B$

CHAPTER 6

FINDINGS AND CONCLUSIONS

6.1 Although preliminary, the findings of the analysis give a very good insight into the functioning of the educational decision-making sub-system.

6.2 Some General Conclusions

It seems that the decision process is more centralized than may at first appear. The Minister of Education seems to have the ultimate responsibility even for decisions of little relative importance. The consequences of such a centralization are not difficult to appreciate. More particularly, the following findings seem to result from the centralized nature of the decision-making system.

- The Minister himself evaluates the decisions to be taken and uses evaluative criteria which he rarely discloses or discusses with others involved in educational decision-making.
- The criteria the Minister uses are frequently of a political nature and may not always contribute to a balanced educational policy.
- The fact that the Minister tends to apply his own criteria is not conducive to the necessary processing of all relevant information before a decision is taken. Those engaged in decision-making do not feel encouraged to undertake an "objective" evaluation and are either very much constrained by the existing rules and regulations which do not allow them to innovate and/or express some kind of "progressiveness", or they try to interpret these rules and regulations according to the "image" they have of the Minister's evaluative criteria.
- There is a diffusion or even lack of administrative responsibility since the ultimate responsibility falls on the Minister himself.
- A highly complex decision-making process has been established but is rarely used and leads to the decision-making system's rigidities.

6.3 Proposals

At this stage, the recommendations which could be made concern the need for a more thorough study of the administrative decision-making system with a view to more precise documentation of the preliminary findings of the present study; on this basis it would be possible to proceed to concrete proposals for the system's reorganisation.

At the same time, a re-examination of the prevailing rules, administrative regulations and legislation governing decisions should be undertaken with a view to simplifying, modernizing and codifying them. It seems that there is often confusion as to which rules apply to which decisions. There are moreover many out of date rules which still prevail and which do not allow decisions to be taken according to current social thinking.

CHAPTER 7

THE FINANCING SUB-SYSTEM

7.1 As was mentioned in the Introduction, it was thought necessary to make a separate study of the "Financing Sub-System" defined here as the system responsible for decisions relating to the financing process (i.e. the securing and spending of financial resources) of the educational system.

Financial inputs are usually treated as constraints for the attainment of the system's goals and, therefore, the system's goals are set ex post. In the present study, the approach was different. The system's goals are set ex ante to the financial constraints and are influenced only by the educational needs of the various social systems. Financial constraints do enter into the discussion, but at a later stage, together with other types of constraints. In the light of all these constraints the system's goals may be modified to take account of the feasibility criterion (see Diagram 3).

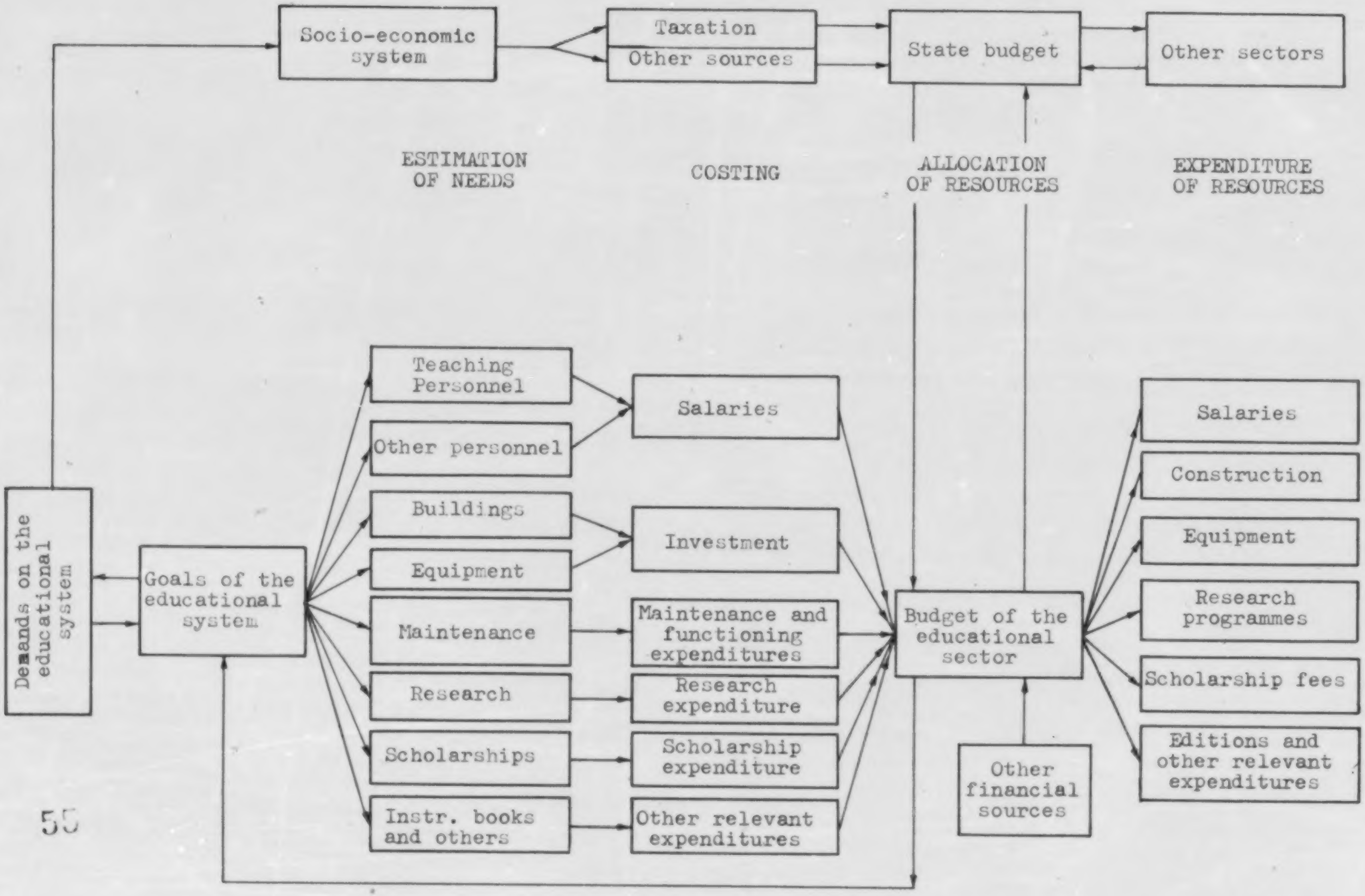
The steps, which are shown in Diagram 4, were the following:

- Formulation of the system's goals, according to perceived educational needs of the various social systems.
- Estimating the real inputs for meeting the system's goals.
- Calculating the financial cost of the real inputs needed.
- Securing the necessary financial resources.
- Spending the financial resources provided to secure the necessary real inputs.

The study therefore concentrated on the identification of the mechanisms involved in the processing of the above steps and the means used. The method involved an attempt to answer such general questions as:

- Who decides (at every level)?
- How are decisions taken; how are they communicated?
- What type of techniques are used?
- What are the time horizons considered?
- Is there any real communication between planning (goal-setting) and the budgeting?
- How centralized is the system?
- Where do resources come from (in order to determine the educational system's autonomy)?
- Is there any control exercised at the various levels?

DIAGRAM 4


Socio-economic system
Taxation
Other sources
State budget
Other sectors
ESTIMATION OF NEEDS
COSTING
ALLOCATION OF RESOURCES
EXPENDITURE OF RESOURCES
Demands on the educational system
Goals of the educational system
Teaching Personnel
Other personnel
Buildings
Equipment
Maintenance
Research
Scholarships
Instr. books and others
Salaries
Investment
Maintenance and functioning expenditures
Research expenditure
Scholarship expenditure
Other relevant expenditures
Budget of the educational sector
Other financial sources
Salaries
Construction
Equipment
Research programmes
Scholarship fees
Editions and other relevant expenditures

Although the work was of a descriptive nature, some quantitative figures, especially in the form of indicators used, are also presented.

7.1.1. Formulation of Objectives

The formulation of the system's goals was extensively discussed under the "Goal-Setting Sub-System", and there is therefore no need to describe it here.

7.1.2 Estimating the Real Inputs for Meeting the System's Goals

This is a question of making a quantitative estimation of the various real inputs needed for the successful operation of the educational system. For the Greek public educational system the responsibility for this lies with the General Directorates of the Ministry of Education. As to the private sector, the responsibility is vested within each school unit (enterprise).

More particularly, the estimation of the most crucial inputs is done by level of education.

7.1.2.1 Teaching Personnel

(A) Primary Education

The posts of teaching personnel are decided according to the number of pupils enrolled as listed below:

- One-post schools: one teacher per 15 - 40 pupils
- Two-post schools: two teachers per 41 - 80 pupils
- Schools with several posts: one teacher per 40 pupils maximum

Table 9 shows the average pupil/teacher ratio. Over the last two years, it seems that the pupil/teacher ratio has been reduced to 32. This ratio takes account of the private schools.

TABLE 9

Year	Teaching Personnel	Pupils	Pupils/ Teachers
1965-66	25,246	911,768	36.1
1966-67	26,310	913,221	34.7
1967-68	25,737	903,004	35.1
1968-69	25,291	899,007	35.1
1969-70	25,902	882,821	34.1
Average for the 5-year period			35.0

(B) Secondary Education

At the secondary level requirements for teaching personnel are estimated as follows:

Three variables are considered: the composition of the programmes by grade in terms of the type of courses grouped in general classes: classical, theoretical or applied; the size of a class (up to 40 pupils and, exceptionally, up to a maximum of 50); and the work load of the teacher (24 hours per week).

Example

Suppose that in all secondary schools (gymnasia) there are:

570 classes in grade A
480 " " " B
300 " " " C

According to the school programme, the teaching hours per week for a course of mathematics for example are:

3 hours for grade A
5 " " " B
8 " " " C

Thus, the total work load for mathematics by grade is:

Grade A: 570 x 3 = 1,710 hours
Grade B: 480 x 5 = 2,400 hours
Grade C: 300 x 8 = 2,400 hours
Grand Total 6,510 hours

Taking into account that the weekly load per teacher is 24 hours, a total of 271 teachers of mathematics are needed.

Table 10 shows the average pupil/teacher ratio for periods of five years. As in the case of primary education, the ratio has improved.

TABLE 10

Year	Teaching Personnel	Students	Students/ Teachers
1965-66	10,130	326,983	32.3
1966-67	10,978	341,641	31.1
1967-68	10,722	361,257	33.7
1968-69	10,352	369,897	35.7
1969-70	11,878	383,594	32.3
Average for the five-year period			33.0

(C) Technical Education

The procedure here is similar to that of secondary education and the same standards apply.

(D) University Education

There is no definite procedure for establishing posts for professors nor is there a standard student/professor ratio since it depends upon the type of courses and academic chairs.

A more definite procedure along with pre-determined standards exist for the posts of lecturer, teaching and laboratory assistants. For the Faculties of Science the standard is set at 35 students per lecturer or teaching or laboratory assistant. This standard is increased to 50 students for theoretical subjects. As a minimum standard, each laboratory unit and/or clinic has at least three assistant personnel composed of one of each of the three types (i.e. lecturer, teaching and laboratory assistant); in the case of a museum, a workshop or a chair, the minimum standard is two, i.e. one lecturer and one assistant or two assistants.

Table 11 shows the actual ratios for periods of five years.

TABLE 11

STUDENT/PROFESSOR RATIOS

	Institutions		1965-66	1966-67	1967-68	1968-69	1969-70
1.	Athinai University	S.	17180	18794	21017	22378	22694
		P.	825	967	930	924	1228
		S/P	21	19	23	24	19
2.	Thessaloniki University	S.	17395	18996	20849	23680	23240
		P.	770	881	916	859	944
		S/P	23	22	23	28	25
3.	Ioannina University	S.	419	685	1208	1268	1451
		P.	12	22	27	27	29
		S/P	35	31	45	47	50
4.	Patrai University	S.	—	144	458	627	847
		P.	—	4	16	16	41
		S/P	—	36	29	39	21
5.	National Technical University (Athens)	S.	3267	3384	3691	3722	3614
		P.	320	511	497	361	371
		S/P	10	7	7	10	10
6.	The Graduate School for Economic and Business Science	S.	4779	5465	5958	6314	6255
		P.	21	23	21	19	38
		S/P	228	238	284	332	165
7.	**Panteios** School of Political Sciences	S.	4621	6206	6928	7106	6933
		P.	17	18	23	22	26
		S/P	272	345	301	323	267
8.	Industrial Studies School of Piraeus	S.	3779	3868	4649	4088	4764
		P.	41	43	44	38	33
		S/P	92	90	106	108	144
9.	Industrial Studies School of Thessaloniki	S.	1649	1833	2025	1865	1699
		P.	12	15	17	18	26
		S/P	137	122	119	104	65
10.	Higher Agricultural Science School of Athens	S.	891	1008	1188	1294	1128
		P.	72	86	88	88	117
		S/P	12	12	14	15	10
11.	Fine Arts School	S.	281	241	265	278	254
		P.	15	15	16	16	21
		S/P	19	17	17	17	13

7.1.2.2 Other Personnel

There are laws which make specific provision for the non-teaching personnel as, for example:

(A) Primary Education

- Inspectors: 176 posts (one for each of the 176 educational inspectorates)
- Prefecture Inspectors: 39 posts
- General Inspectors: 10 posts
- Alternate General Inspectors: 7 posts

(B) Secondary Education

- Inspectors: 61 posts (one for each of the 61 administrative inspectorates)
- General Inspectors: 10 posts
- Alternate General Inspectors: 5 posts

7.1.2.3 Building Sites

The Directorate of Planning Investment and O.R. of the M.E. is responsible for estimating needs for building sites.

Table 12 shows the standards adopted for the various types of education. These standards tend to reflect international norms.

In fact, in the case of newly planned institutions, the following is true:

- University of Athens campus, 150 m^2 per student.
- Polytechnical campus, 200 m^2 per student.
- Patrai University, 250 m^2 per student.
- Ioannina University, 250 m^2 per student.

TABLE 12

Educational Level	Area in m^2 per student		
	Ideal	Minimum	Acceptable
Elementary	18-20	15	$8^{(1)}$
Secondary	18-20	15	$8^{(1)}$
Technical (lower and secondary)	-	20	-
Technical (higher)	-	$25^{(2)}$	-
Universities	-	$250^{(3)}$	-

Note: (1) In urban centres and developed areas.

(2) The common utility needs vary in accordance with the set-up.

(3) In the case of planning for a new university.

7.1.2.4 School Buildings

There are no uniform standards for estimating building requirements. Table 13 shows the prevailing standards.

In the case of school buildings **the following standards are used:**

- Classroom capacity - 40 students.
- Teaching area provided for each student $1.5m^2$; consequently, classrooms of $60m^2$.
- Classroom net height = 3.2 m and as a result the gross height of classrooms = 3.50 m.
- The overall covered area including offices, corridors, campuses, etc. is 2.5 times bigger than the teaching area.

It should be stated that the Ministry of Education has fixed norms for building (i) elementary schools for 160 or 240 pupils and (ii) gymnasia for 360, 480, 600, 720, 840, 960 and 1200 students.

TABLE 13

Educational level	Students	Area required per student		Mean height	Volume per student (m^3)	
		M.Educ.	S.B.O.		M.Educ.	S.B.O.
Elementary	1	4.5	3.75	3.5	15.1	13.1
Secondary	1	5.0	3.75	3.5	17.5	13.1
Professional	1	6.5		3.5	22.7	-
Higher (see below)						
University campus(1) (indicatively)						
• Natural Sciences School	1	10		4.40(2)	44	
• Theology School	1	9		4.40(2)	40	
• Law School	1	5		4.40(2)	22	
• Philosophy School	1	6		4.40(2)	66	
• Medecine School	1	10		4.40(2)	44	

Sources: (1) Technical Service University of Athens.

(2) As estimated by the Ministry of Education.

7.1.2.5 Maintenance of Buildings

There are no fixed procedures and standards for estimating the respective needs.

7.1.2.6 Equipment - Maintenance of Equipment

There are no fixed procedures and standards for estimating the respective requirements.

7.1.2.7 Books

Book requirements for all but university level are estimated by the inspectors on the basis of expected enrolments. The information is transmitted to the respective General Directorates of the M.E.

Book requirements at the university level are estimated separately by each professor on the basis of the number of students* enrolled.

7.1.3 Cost Calculation of the Real Inputs Required

The estimated real inputs are converted into financial inputs (current and capital) by a rather simple costing exercise. The procedure is as follows:

(i) Personnel Expenditure (current account)

The calculation of total salaries to be paid to all types of personnel can be made with a high degree of accuracy.

Salaries to regular personnel are calculated on the basis of: the number of personnel at work by type and grade; the number of years personnel spend in the same grade; the salary scale (taking account of various allowances).

Total expenditures for new posts are calculated on the basis of the salary (and allowances) corresponding to the entrance grade. (The entrance grade, the number of new posts and the eventual margins of increase are set by special decrees).

(ii) Building Site Expenditure (capital account)

Estimation of the necessary financial expenditure for acquiring the land needed is made on the basis of unit cost (cost per m^2 of land). This unit cost varies both with the town and the exact location of a site in a particular town. The calculations are made by the Planning Investment and O.R. Directorate on the basis of information gathered directly from each town concerned.

---

* University textbooks are provided free of charge, as are textbooks at all other levels of education in the public sector.

(iii) Building Construction Expenditure (capital account)

Estimation of the expenditure for the construction of a school (and other) buildings is also made on the basis of unit cost. The work is, however, a little bit more complicated and often requires revision because of changes in unit costs. The units employed are based on one or a mix of the following magnitudes: area (covered and free); volume of buildings; students, etc.

Table 14 shows some figures for the period 1968-69.

TABLE 14

Educational level	Cost of Building		
	per class room	per m^2	per student(2)
Primary	550,000	2,500	13,750
Secondary	650,000	2,500	16,000
Professional (lower and secondary)	-	3,000(1)	21,000
	-	-	34,000(4)
Higher	-	5,000(3)	40,000(3)

Notes: (1) Very reliable since they are taken from data for the building of six technical schools.

(2) Estimation Standard Cost ± 10% for all of the country (1969).

(3) Data: University-city planning. It should be pointed out that the cost per student in Higher Institutes with science faculties (e.g. the Polytechnical School) is much higher, because of laboratories, etc.

(4) The Higher Technical Education Centres are in the planning stage and the cost per student taken for this study is 41,000 drachmas (today's cost). The amount of 34,000 drachmas given in the Table is based on 1969 prices.

(iv) Building Maintenance Expenditure (current account)

These are estimated on the basis of various demands received and/or as a percentage of total expenditure based on previous years' experience.

(v) Equipment Expenditure (capital accounts)

This category covers laboratory equipment, demonstration materials and furniture. The standards employed are taken from studies of various international organisations (e.g. the OECD for general education 1965)* adapted for price increases.

(vi) Book Expenditure

In the public education sector, books are given free of charge to pupils at all educational levels including the university level.

Total expenditures for the purchasing of books are therefore estimated at the M.E. By educational level the procedure followed is:

(A) General Education

There is a School Books Organisation (S.B.O.) which is responsible for printing approved textbooks. Expenditures are usually divided into two parts: for the writing of the textbooks (in the nature of prizes for those approved) and the actual printing done by S.B.O. Estimates for printing costs are provided directly by S.B.O. on the basis of the number of books needed. The number is estimated on the basis of past experience since there is no need for yearly revision and/or change of the textbooks.

(B) Technical Education (lower and middle)

The Evgenidion Foundation was made responsible for the publishing of all textbooks for technical schools. The Foundation sells the books to the M.E. at cost price and the M.E. makes provisions in its annual budget for purchasing the necessary number of textbooks.

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* OECD, Development and Economy in Educational Building, Paris, 1968 (see also the individual report on Greece, prepared by the S.B.O., Greece, 1965).

(C) Higher Education (university and non-university)

The professors responsible for the teaching of a course are equally responsible for the writing and printing of textbooks.

The professors submit in turn to the M.E., detailed accounts for the actual cost and are reimbursed as follows (according to present legislation):

Up to 200 copies	135% of the cost
For 200-500 copies	90% of the cost
For 500-1,000 copies	65% of the cost
For 1,000-1,500 copies	50% of the cost
Over 1,500 copies	30% of the cost

A professor also receives an additional 20% of the cost of the book in the form of royalties.

(vii) Operational Expenditure (current account)

This category includes items such as: rents, utilities, cleaning, etc. Estimates are based on past experience and/or specific demands.

7.1.4 Financial Sources - The State Budget

Educational expenditures for the public sector are covered by the annual State Budget which is made up of income received from the following general categories:

- Taxation: direct and indirect
- Profit, from public property
- Profit, from public enterprises
- Government participation in the profits of various institutions and organisations
- Gifts and bequests
- Various fines
- Other sources

From the above, it is obvious that there is no State income related directly to educational activities such as special educational taxes and/or fees, with the exception of the property owned by several educational institutions and particularly the universities*.

For this reason the share for education is decided in relation to other sectoral needs and not necessarily in relation to "educational needs" as defined above. This is true for both current and capital expenditures.

In the absence of any central planning and budgeting system, the annual budget is usually worked out on an incremental basis which also applies to the sectoral budgets. Thus, the educational budget is worked out, more or less, according to the "ceiling" for both current and capital expenditures communicated to the M.E. by the Ministry of Finance and Ministry of Planning,** respectively. More particularly, the preparation of the budget of the M.E. proceeds as follows:

(i) Current Budget

The recommendations of the General Directorates are put together by the Budget Section of the Administrative Directorate, which prepares a standardised budget (i.e. following the structure of the State Budget) to be sent to the Ministry of Finance after being approved by the Minister of Education.

The current budget includes the following items:

- Salaries
- Operating expenditure
- Procurements (stationery, etc.)
- Travelling expenses
- Subsidies to higher and scientific institutions (e.g. universities, observatories, etc.)
- Rentals, etc.

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* The property (usually in the form of real estate) of various schools of general education (including teacher colleges) is controlled directly by the Ministry of Finance. The property of the universities is managed by the Senate and the Economic Council of each institution. The final university budgets, however, are submitted to the Minister of Education for his approval.

** Now Ministry of Co-ordination.

63

(ii) Capital Budget

This is financed by the Public Investment Budget and covers:

- Purchasing of building sites
- Construction of buildings
- Purchasing of equipment
- Studies and surveys.

The Ministry of Planning sets the ceilings by level of education together with the principles of a general educational policy. More specifically, the procedure for estimating the capital account is as follows:

(A) General Education

The Prefecture Supervisor determines the investment (in schools) needs of his district which he communicates, in turn, to the Regional Administration*. From each Regional Administration the information is formally transmitted to the Ministry of the Interior. The Ministries of Education and of Planning are also informed.

In the M.E., the Directorate of Planning Investment and O.R. sets up a plan within the limits set by the Ministry of Planning and any which may have been set by the Ministry of the Interior.

(B) Technical Education

The General Directorate for Technical Education is responsible for determining investment needs in technical education and communicates its recommendations to the Directorate of Planning which incorporates them into the general educational investment budget.

(C) Higher Education

Estimates for investments are made directly by the various institutions and communicated to the M.E. (Directorate for Planning).

Any eventual need for curtailing investment is discussed with the institution concerned.

---

* Regional Administration has recently changed but there is no fixed procedure as yet.

7.1.5 Implementing the Budget

The expenditure of both current and capital budgets follows a rather centralized and well-determined procedure.

Since most of the personnel of the public educational sector are civil servants, their salaries are paid from public funds.

Rents are paid out of the public purse on receipt of a special form.

Before any payment is affected it is checked by the Service of Ordered Expenditure of the M.E.* or by the Public Accounting Service of the district (at the level of the Prefecture).

Payments from the capital budget are effected according to bank procedures. Relevant accounts (usually by project) are opened in the Bank of Greece.

For general and technical education, a project supervisor (usually an engineer from the Prefecture) is appointed. He fills in the financing requests according to the progress of the work and forwards them to the School Building Organisation, which sends them, in turn, to the Ministry of Planning for final approval. The School Building Organisation, after receiving the Ministry of Planning's authorization, proceeds with the financing of the Prefecture accounts (which undertake direct payment) through direct orders to respective local offices of the Bank of Greece.

Any payment accrued is passed as a debit to the M.E. account.

The financing of university projects follows more or less the same procedure. The M.E. approves the financing requests sent to the Ministry by the technical service of the higher institutes, and it sends the necessary orders to the Bank of Greece. Control is exercised by the Service of Ordered Expenditure and the Control Council.

---

* This service belongs to the Ministry of Finance

CHAPTER 8

FINDINGS AND CONCLUSIONS

8.1 Within the existing administrative structural constraints, it seems that the procedures followed and the existing communication between the M.E. and the other two Ministries, i.e. that of Planning and of Financing, as well as the communication within the M.E., are satisfactory. This, however, should not prevent us from detecting some real functional weaknesses which exist and which may prevent the educational system from functioning effectively overall.

As is true with almost all other public sectors, the public educational system has very little autonomy in terms of its financing. All crucial decisions relating to both general educational policies and financial constraints are taken outside the system. One may detect, however, some interfaces that exist at high governmental levels (e.g. the Ministerial Council), but these do not seem sufficient for the development and implementation of an effective educational strategy. The logical steps indicated in Diagram 4 cannot be followed as long as the M.E. can only know in advance the means at its disposal for a period of no longer than one year. Under these conditions the system tends not to adopt any positive policy-making attitude since it must continuously adapt itself to the existing financing procedures. This reduces the autonomy and flexibility of the public educational system. The situation also affects the longer term planning activities of the M.E. and its ability to make forecasts for the future.

8.2 Proposals

It is perfectly well understood that any innovation affecting the financing of the educational system will also affect the overall governmental financing system and with this in mind the following tentative recommendations are made.

- The educational system should be given more autonomy to establish an effective planning and budgeting procedure so that it can become more responsive to the overall societal educational demands.

- Because the public educational system is a public enterprise, the M.E. should be given more autonomy in the implementation of its programmes. Less centralized financing procedures should be established with a view to increasing the flexibility of the educational financing system.

- For the same reason, some fixed financial resources should be permanently transferred to the public educational system to allow it to establish a minimum educational development policy. Only increments above this minimum should be discussed by the Ministerial Council; otherwise, the Minister of Education will always have to fight not only for the increment but also for the minimum level of the system's financial resources.

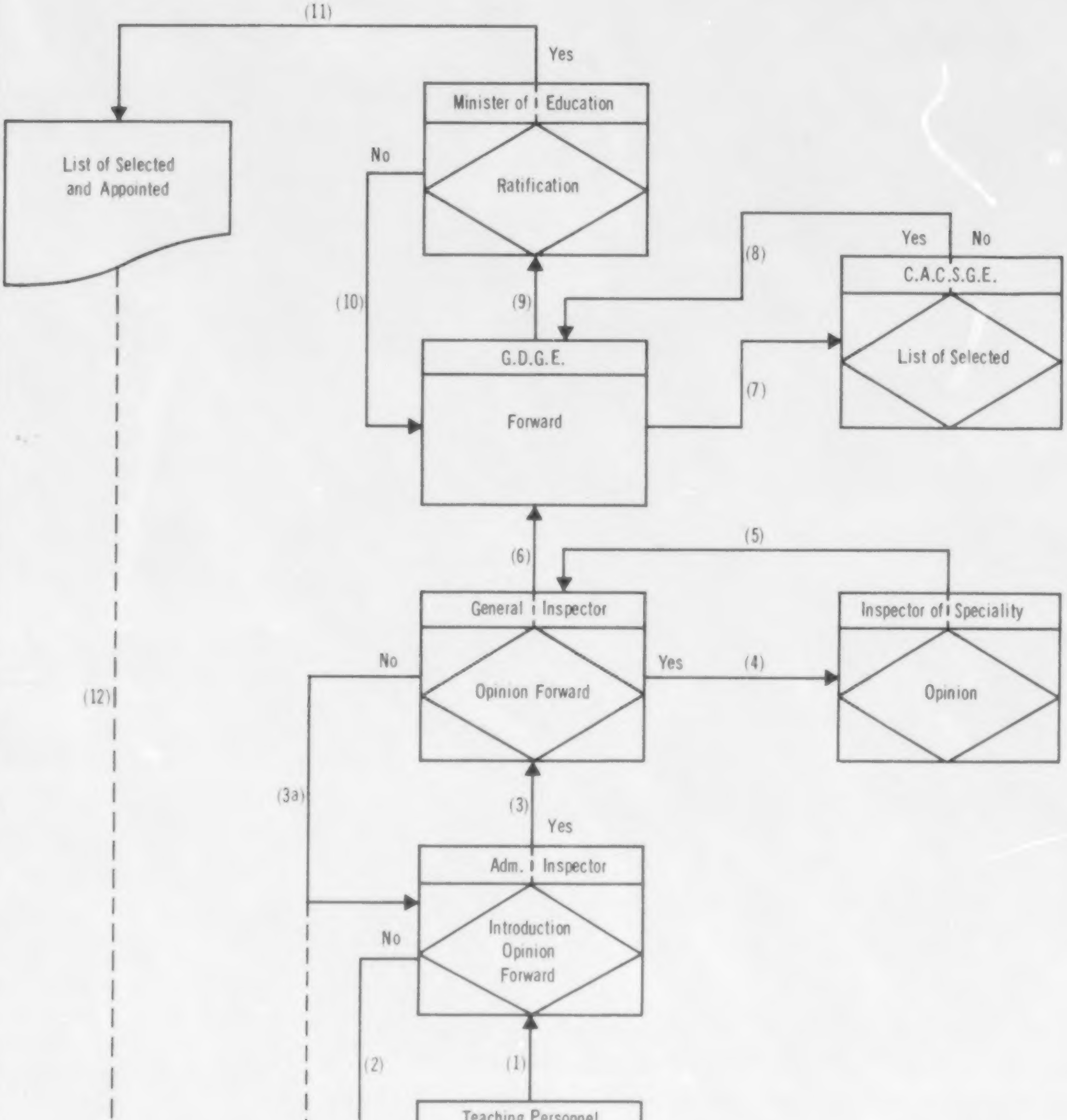
- As a prerequisite for the above, the M.E. should reinforce its central planning activities and, at the same time, undertake an administrative reorganisation with a view to reinforcing its regional structures for a more effective programme implementation and control.

APPENDIX A

Activity Flow Charts

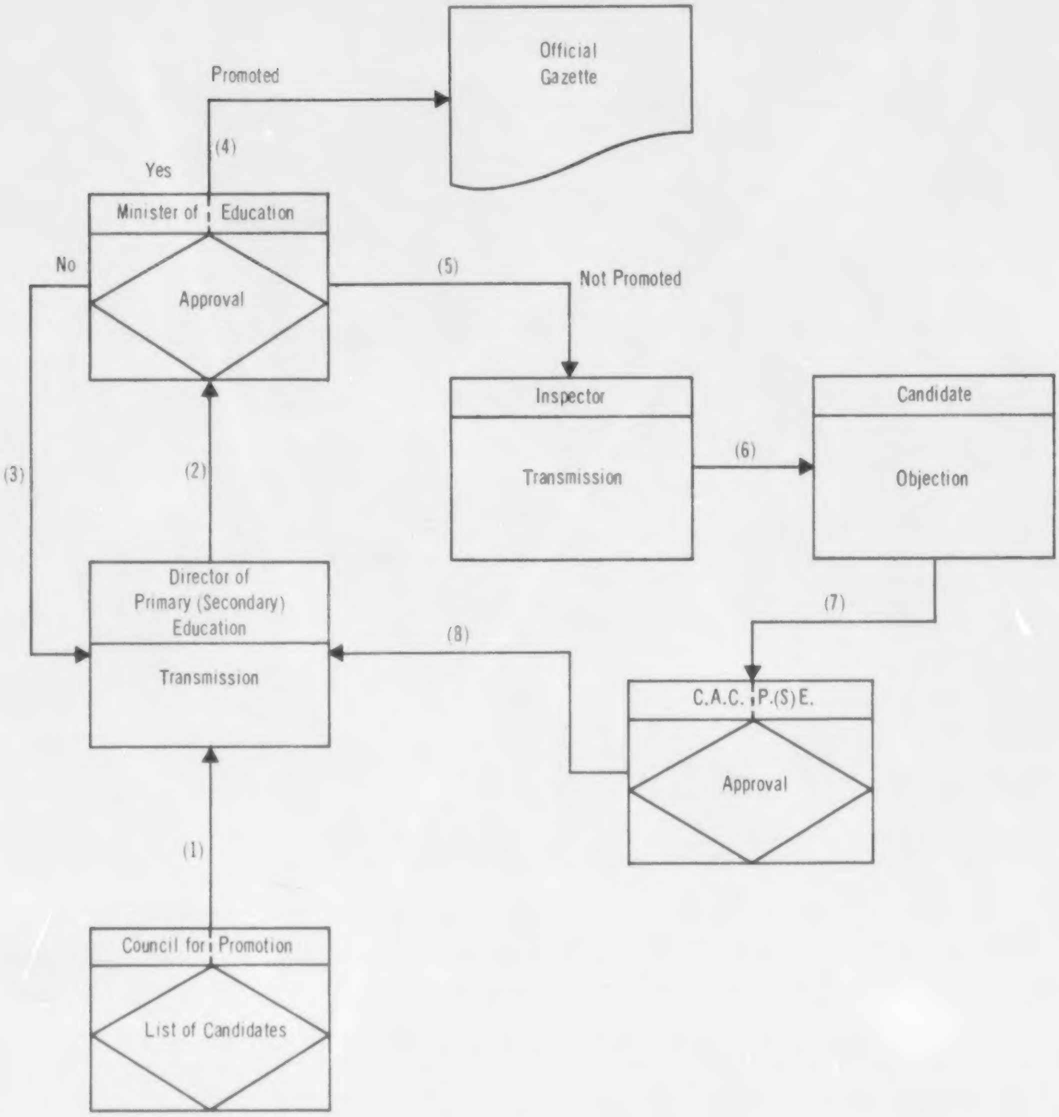
ACTIVITY FLOW CHART 2.4.5.

Selection and Appointment of Inspector of G.E.


(11)
Yes
Minister of Education
Ratification
No
List of Selected and Appointed
Yes
No
(8)
C.A.C.S.G.E.
List of Selected
(10)
(9)
G.D.G.E.
Forward
(7)
(5)
(6)
General Inspector
Opinion Forward
No
Yes
(4)
Inspector of Speciality
Opinion
(12)
(3a)
(3)
Yes
Adm. Inspector
Introduction Opinion Forward
No
(2)
(1)
Teaching Personnel
Application

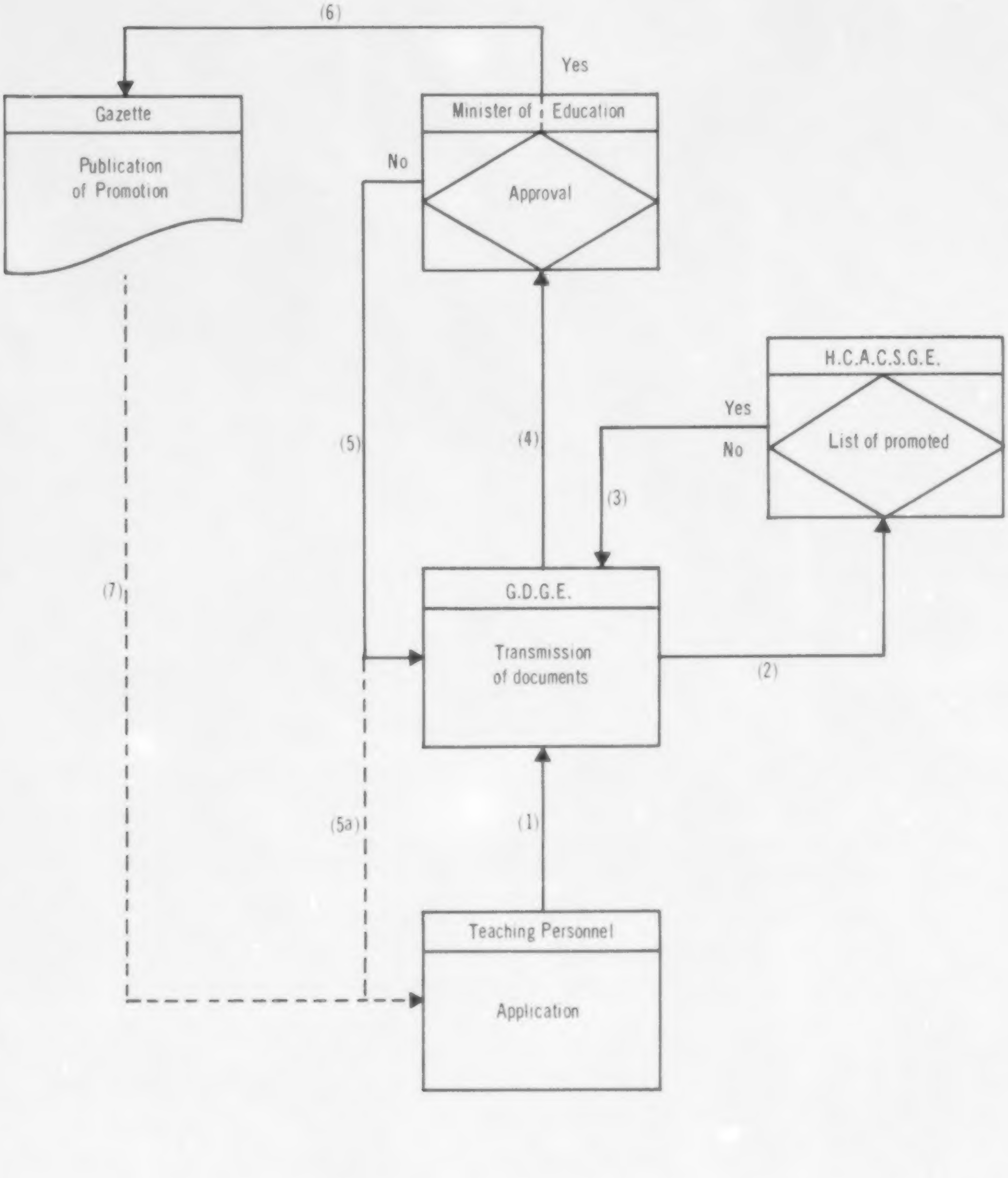
ACTIVITY FLOW CHART 2.4.3.

Teaching Personnel of Primary and Secondary Education


Official Gazette
Promoted
(4)
Yes
Minister of Education
No
Approval
(5)
Not Promoted
Inspector
Transmission
(6)
Candidate
Objection
(3)
(2)
Director of Primary (Secondary) Education
Transmission
(7)
(8)
C.A.C. P.(S)E.
Approval
(1)
Council for Promotion
List of Candidates

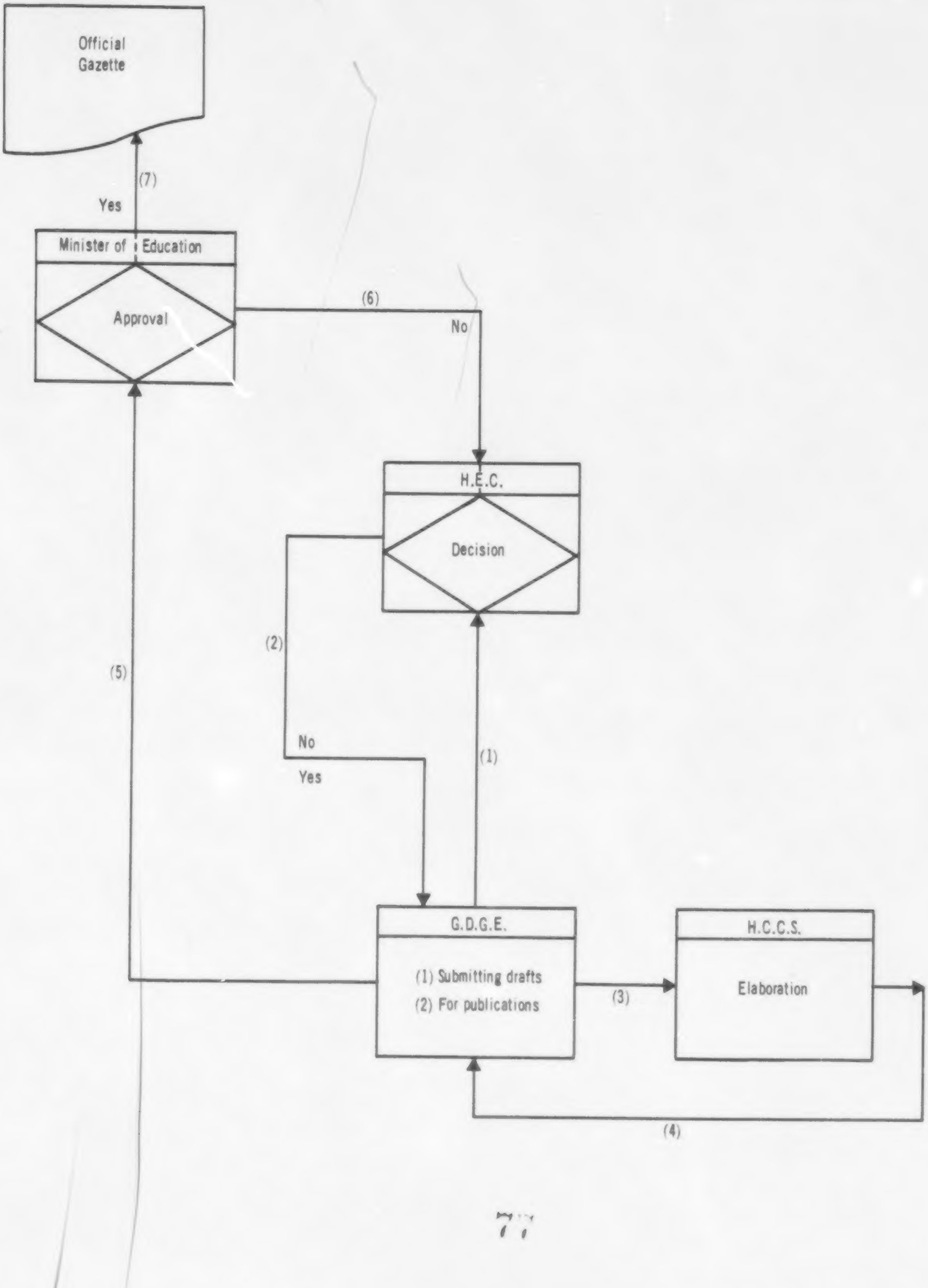
ACTIVITY FLOW CHART 2.4.6.

Supervising Personnel : Promotion


(6)
Yes
Gazette
Publication of Promotion
Minister of Education
No
Approval
H.C.A.C.S.G.E.
Yes
No
List of promoted
(5)
(4)
(3)
(7)
G.D.G.E.
Transmission of documents
(2)
(5a)
(1)
Teaching Personnel
Application

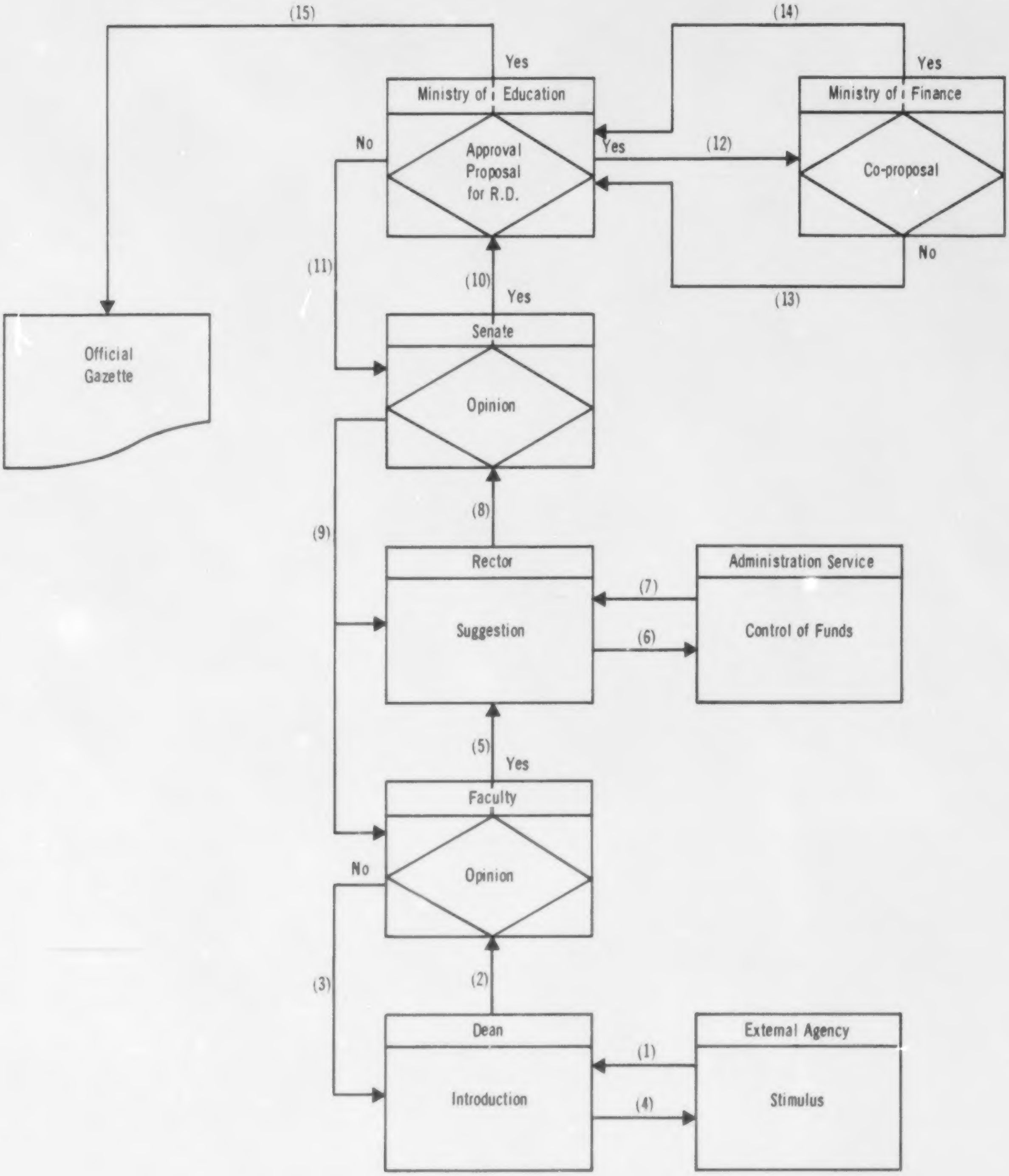
ACTIVITY FLOW CHART 2.2.3.

Establishment or modification of Curricula


Official
Gazette
(7)
Yes
Minister of Education
Approval
(6)
No
H.E.C.
Decision
(2)
(5)
No
Yes
(1)
G.D.G.E.
(1) Submitting drafts
(2) For publications
(3)
H.C.C.S.
Elaboration
(4)

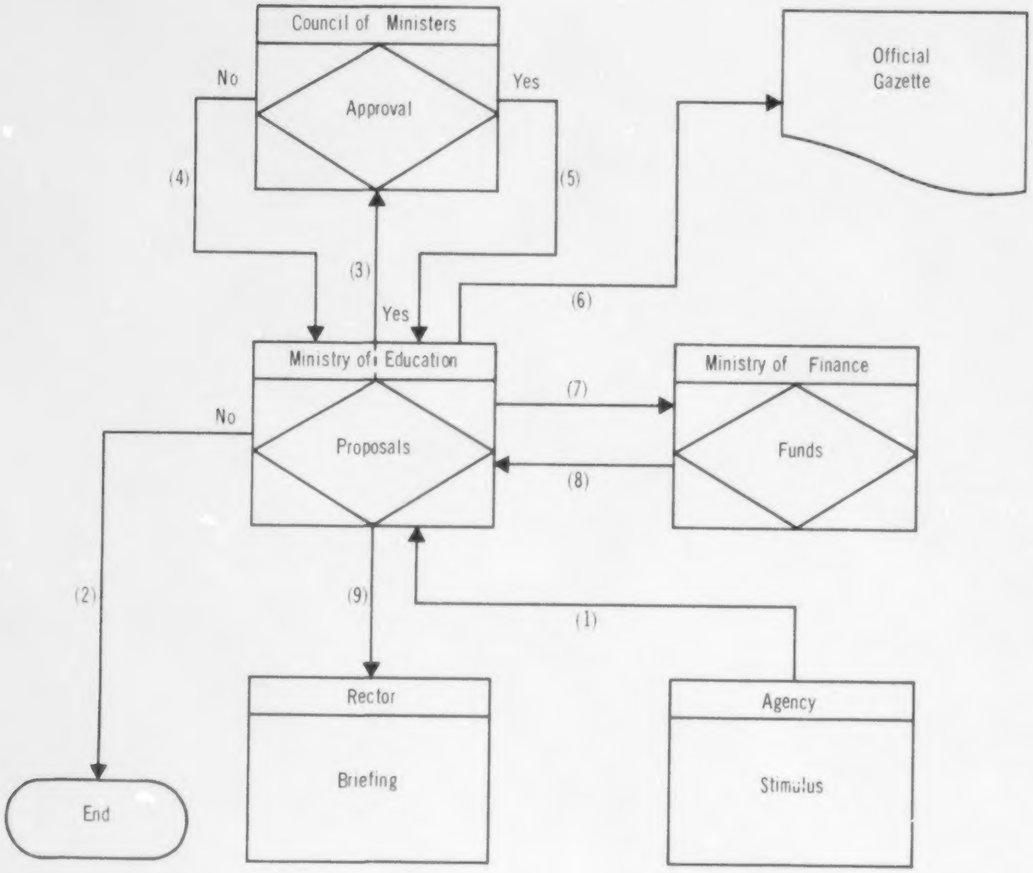
ACTIVITY FLOW CHART 1.1.2.

Establishment, Modification, Abolition of University Departments


(15)
(14)
Yes
Yes
Ministry of Education
Ministry of Finance
No
Approval Proposal for R.D.
Yes
(12)
Co-proposal
No
(11)
(10)
Yes
(13)
Official Gazette
Senate
Opinion
(8)
(9)
Rector
Administration Service
(7)
Suggestion
(6)
Control of Funds
(5)
Yes
Faculty
No
Opinion
(3)
(2)
Dean
External Agency
(1)
Introduction
(4)
Stimulus

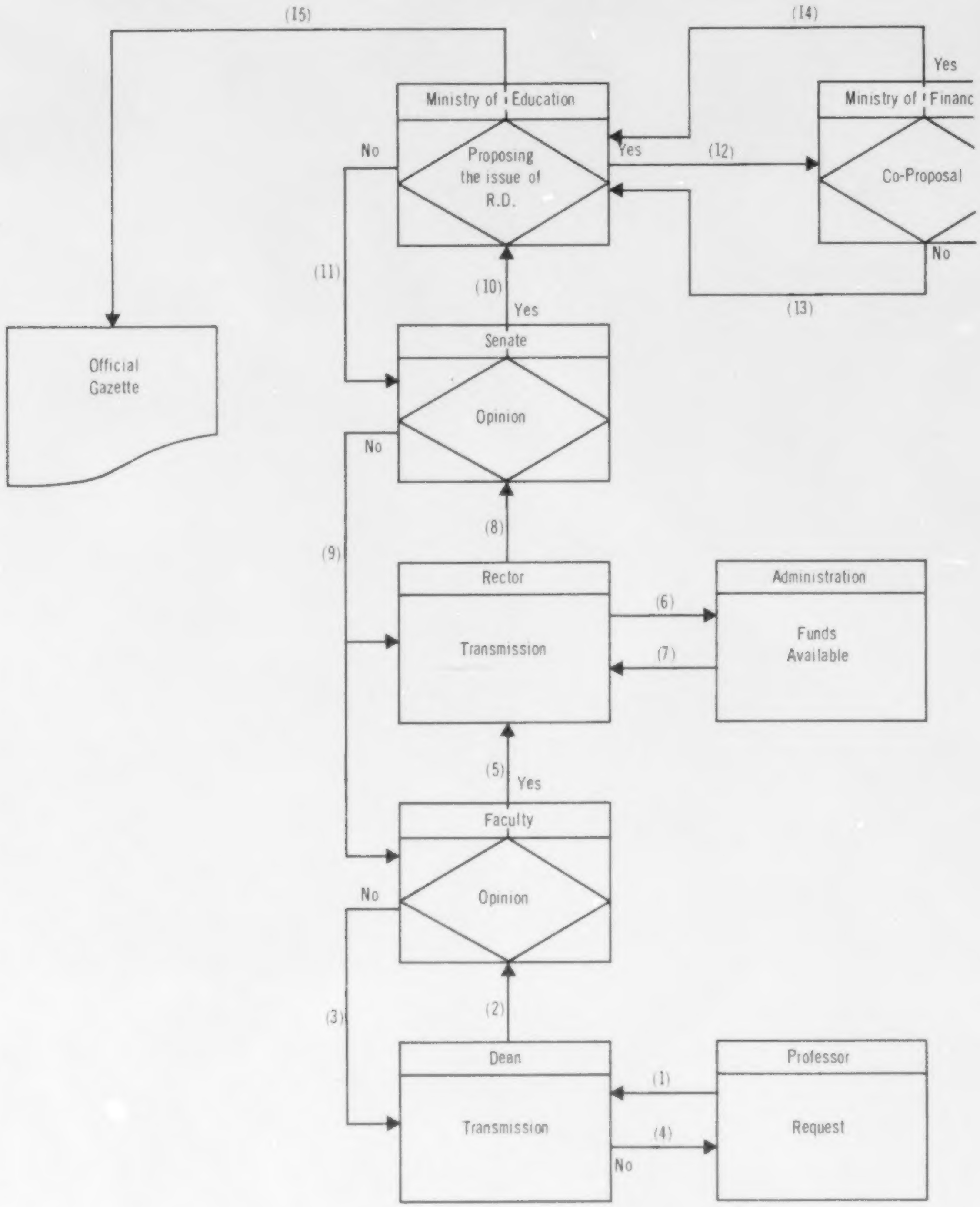
ACTIVITY FLOW CHART 1.1.1.

Establishment, Modification, Abolition of Higher Education Institutions


Council of Ministers
Approval
No
Yes
(4)
(5)
Official Gazette
(3)
Yes
(6)
Ministry of Education
Proposals
No
(7)
(8)
Ministry of Finance
Funds
(2)
(9)
(1)
Rector
Briefing
Agency
Stimulus
End

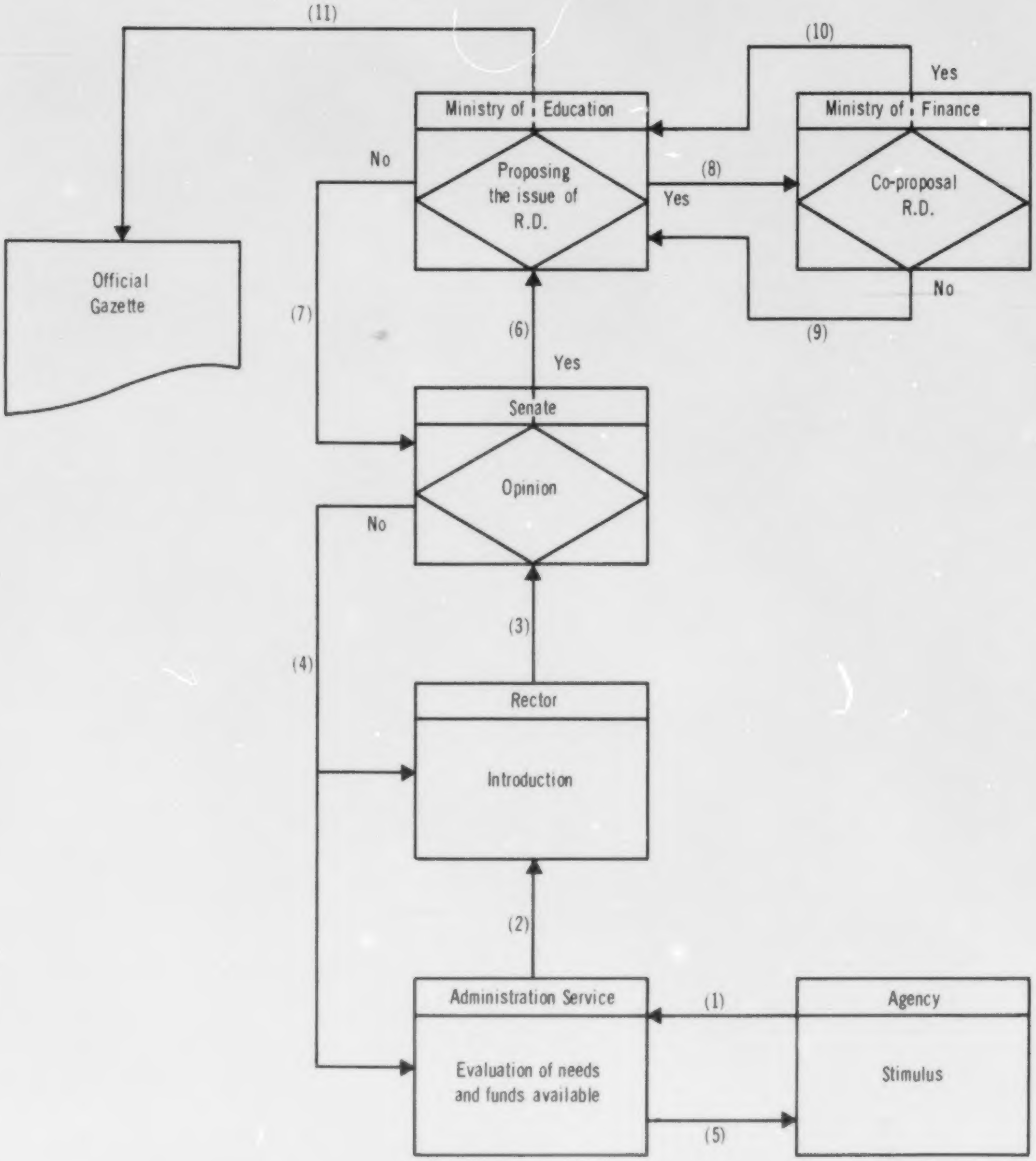
ACTIVITY FLOW CHART 1.1.4.

Establishment, Modification, Abolition of posts for Assistant Teaching Personnel


(15)
(14)
Yes
Ministry of Education
Ministry of Financ
No
Proposing the issue of R.D.
Yes
(12)
Co-Proposal
No
(11)
(10)
Yes
(13)
Official Gazette
Senate
Opinion
No
(8)
(9)
Rector
Transmission
Administration
(6)
Funds Available
(7)
(5)
Yes
Faculty
No
Opinion
(3)
(2)
Dean
Professor
(1)
Transmission
Request
(4)
No

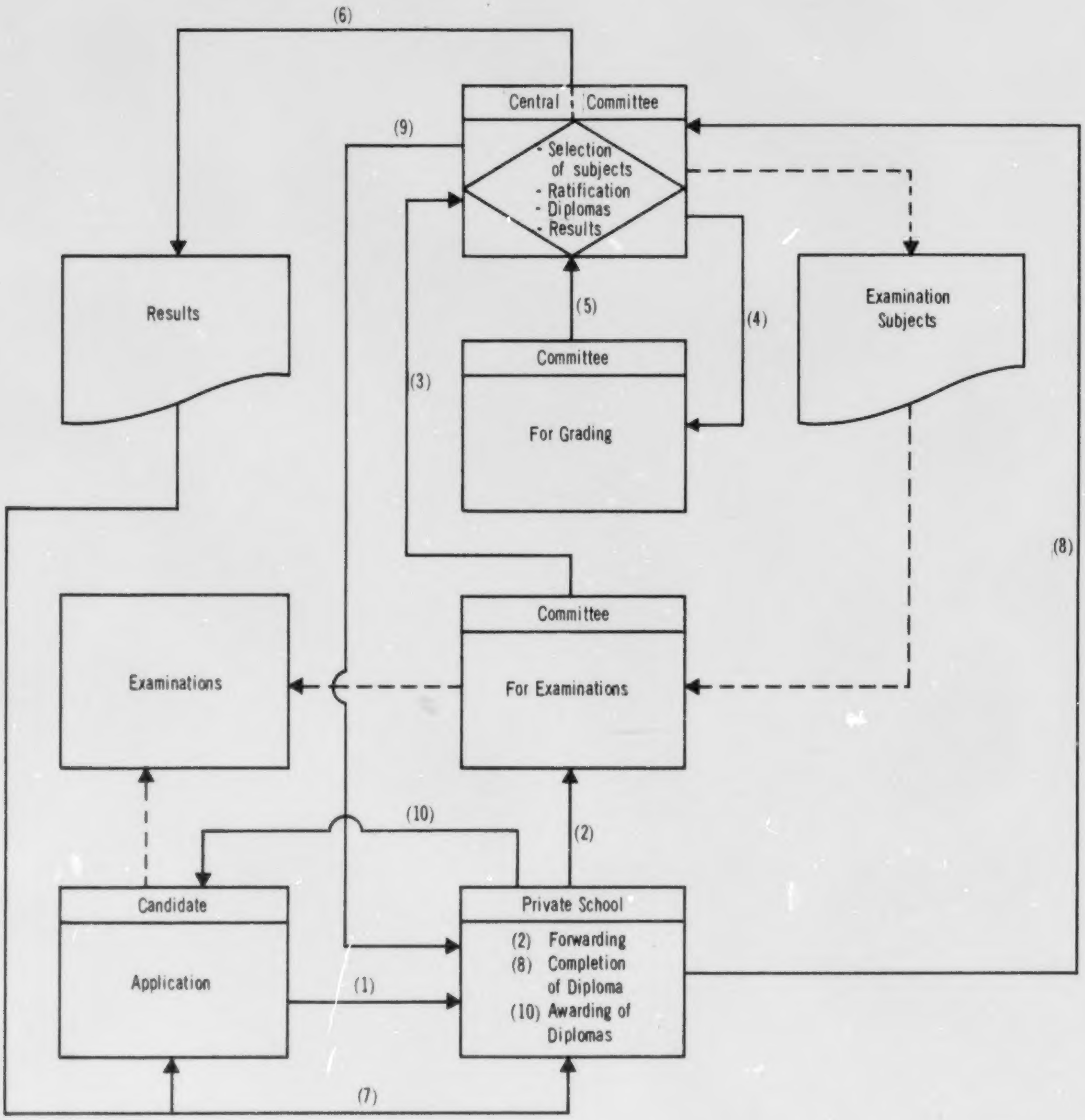
ACTIVITY FLOW CHART 1.1.5.

Establishment-Abolition of Places for Administrative Personnel


(11)
(10)
Yes
Ministry of Education
Proposing the issue of R.D.
No
(8)
Yes
Ministry of Finance
Co-proposal R.D.
No
(9)
Official Gazette
(7)
(6)
Yes
Senate
Opinion
No
(3)
(4)
Rector
Introduction
(2)
Administration Service
Evaluation of needs and funds available
(1)
Agency
Stimulus
(5)

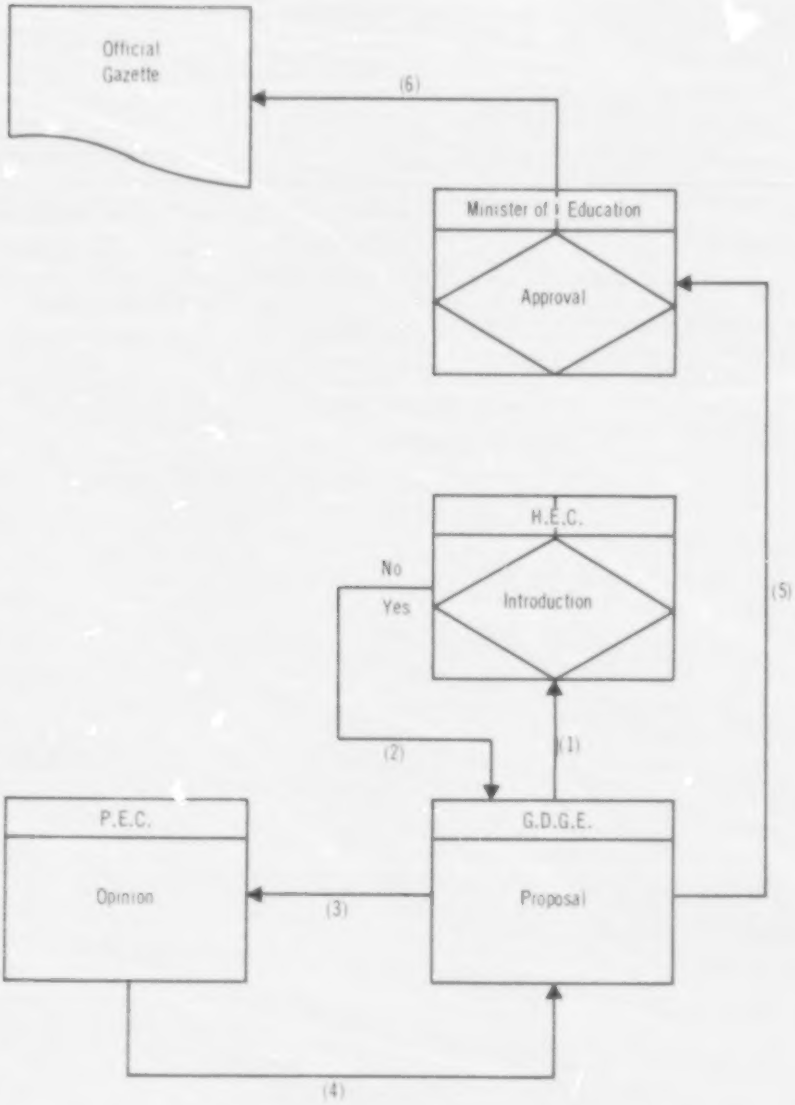
ACTIVITY FLOW CHART 3.3.2.2

Diploma Examination


(6)
Central Committee
(9)
- Selection of subjects
- Ratification
- Diplomas
- Results
Results
(5)
(4)
Examination Subjects
Committee
For Grading
(3)
(8)
Committee
For Examinations
Examinations
(10)
(2)
Candidate
Application
Private School
(2) Forwarding
(8) Completion of Diploma
(10) Awarding of Diplomas
(1)
(7)

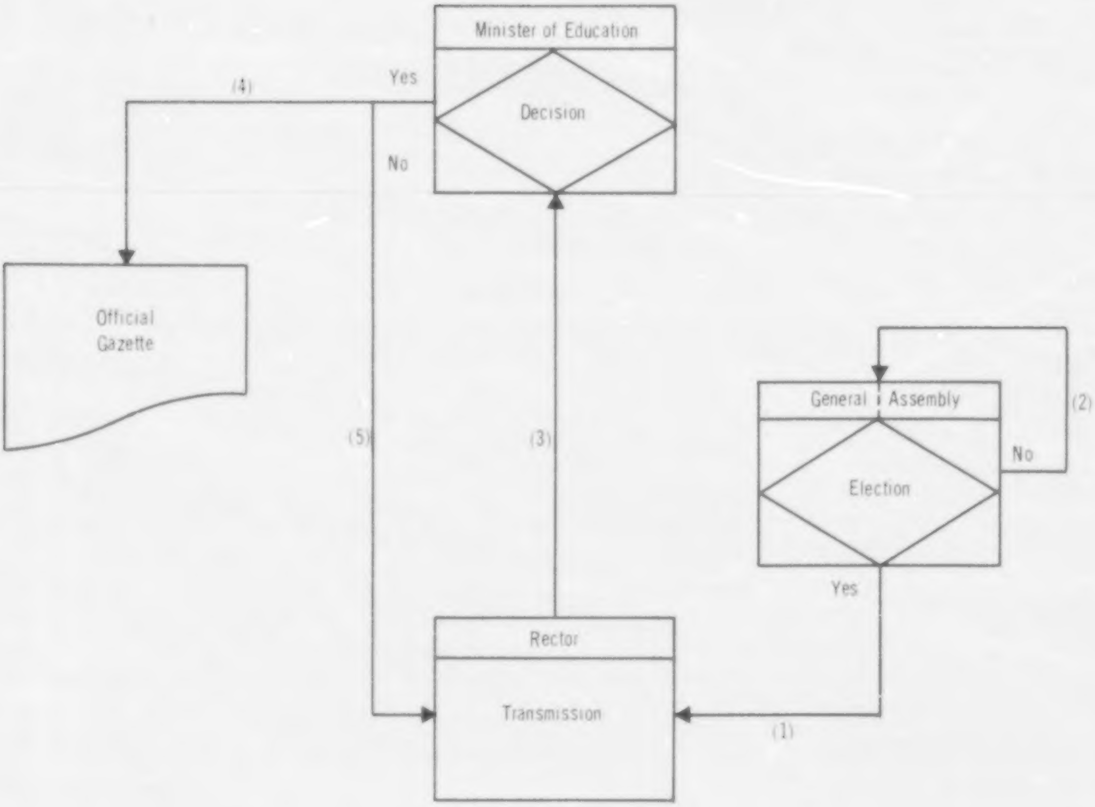
ACTIVITY FLOW CHART 2.2.5

Examinations


Official Gazette
(6)
Minister of Education
Approval
H.E.C.
No
Yes
Introduction
(5)
(2)
(1)
P.E.C.
Opinion
(3)
G.D.G.E.
Proposal
(4)

ACTIVITY FLOW CHART 1.2.1

Election of Rector


Minister of Education
Decision
Yes
(4)
No
Official
Gazette
(5)
(3)
General Assembly
Election
(2)
No
Yes
Rector
Transmission
(1)

APPENDIX B

I. Assessing the Importance of a Decision*

B.1 Introduction

In examining any decision-making system it is at once apparent that the decisions which it is called upon to make are by no means all of equal importance. This statement is so self-evidently true that it appears, at first sight, hardly worth mentioning. However, there are certain implications of this proposition which are potentially of such far-reaching significance that they will be considered in some detail later.

If we ignore, for the moment, the rather formidable difficulties posed by the problem of defining 'importance', let alone measuring it, and assume that we have some means of assigning to each decision a measure of its importance, we can begin to see some of the more striking implications.

One of the major problems in any bureaucracy is that of division of labour. Clearly we can make a simple initial classification of work into staff work, and decision-making. On this classification, staff work covers all the work (which may be very complicated), of elucidating the choices open to a decision-maker. This can be illustrated by two examples, at extremes of the range of complexity.

(a) A junior school teacher applies for leave to attend a short training course. The staff work is very simple, looking up the applicant's personnel file, working out the costs, deciding on the value of the training course, and so on. The decision-making is equally clear-cut; yes or no. The consequences of either choice, to the educational system, as a whole, are unlikely to be detectable.

(b) It is proposed to build a new technological university and there are three cities in which it could be located.
The staff work would be enormous and the decision-making choice is not simply 'yes' and 'no' but 'maybe later', 'where', and so forth.

---

* This is only a part of Dr. Coyle's contribution to the project. The other on the "controlability of a system" was deleted because the "control system" to which it is related was finally left out from the Greek Report.

Since the decisions of type (a) occur fairly frequently, but are of very low importance, there is probably no reason at all why they should arrive on the desk of a high official (as long as there is some kind of review and appeal procedure). On the other hand, example (b) will, and no doubt should, be decided at the very highest level.

Thus, the essence of the division of labour lies, not in the staff work, but in which grade of official should be empowered to decide which questions.

In the absence of such a division, the decisions will inevitably filter higher and higher up the scale of authority until the work-load in the higher reaches becomes intolerable to the individuals there and, almost certainly, inimical to good decision-making. This phenomenon of work-load concentration at high bureaucractic levels manifestly exists in the Greek system. We cannot say whether or not it has any effects on the quality of decision-making unless we have a means of assessing the amount of corrective action (Δ) necessary for correcting the results of a particular decision. If we had a means of measuring Δ we could use it to assess the benefits of alternative divisions of decision-making labour.

The phenomenon of top-heaviness in decision-making work-load, and the confusion which probably exists in the minds of decision-makers about the distinction between staff-work and decision-making, does not arise simply because high officials are incapable of delegation or because their juniors are incompetent, or because the reward/punishment system penalises lower level initiative, though all these factors are present to some degree in any bureaucracy.

It cannot, of course, be argued that the top-heaviness of the work-load arises solely because there is no division of labour at all, since the flow-charting of the decision-making processes has clearly demonstrated that there is some degree of division. It is, however, our contention that a viable method of assessing the importance of a decision could be developed and used to aid the process of analysis of the decision-making structure in the Greek educational system.

Our purpose here is to outline a method, which can be regarded as no more than an initial proposal for measuring decision importance, and also present and discuss a mathematical analysis of decision-making hierarchies.

B.2 Definitions

Before proceeding to assess the factors relevant to determining the "importance of a decision" it is necessary to define exactly what is meant by this phrase. The interpretation which will be adopted here is given below:

> 'The impact which the decision* has on the system and the extent to which it contributes to the attainment of the system's goals'.

In other words it is the importance as viewed from the system as a whole, and not as viewed by any particular subsystem or element of the system. For example, a decision by a school headmaster to implement a proposal intended to increase school pupil morale may be "very important" as viewed from that particular school, but would not necessarily be classified thus for the education system as a whole.

In addition to pointing out the need for such definitions as the one given above, it must also be realised that the importance of a decision as perceived at the present instant of time (i.e. before it is taken), may not be the same as the importance as seen in retrospect (i.e. some time after it is taken). This is so, since at the time (prior to making the decision) of the importance assessment it may well be, and indeed is likely to be, that not all the likely repercussions and effects of the decision can be seen. This means, therefore, that if a particular consequence is not foreseen then the importance of the decision may be understated, and conversely, a particular consequence may be over emphasised resulting in an over-statement of the decision's importance. The value of this slight digression is that it points out the possible need to have a "post decision importance audit" as well as a "pre decision importance assessment". A comparison of the two results would then reveal any major discrepancies together with possible causes, which could then be allowed for in respect of similar future decisions.

B.3 Factors in Decision Importance

At this early stage in the application of system concepts to the Greek educational decision-making structure, we would not expect to be able to produce a definitive, collectively exhaustive and mutually exclusive list of factors. The following list is, therefore, a preliminary version which would require further refinement.

---

* By decision is meant: choice between alternative actions.

Even at this early stage it seems certain that one needs a fairly comprehensive list and that the idea of measuring the importance of a decision cannot be taken to its conclusion on the basis of a list of only three or four factors.

B.3.1 Consequences which might follow

A. Total Educational System

(1)	Local flexibility	The reduction in the future freedom of decision-making for the particular decision-making node by a decision made now.
(2)	System-flexibility	The reduction in the future freedom of decision-making for the system complement of the particular node making the present decision.
(3)	Internal Inaction	The consequences, for the educational system only, of not making a decision at all.
(4)	Reputation	The extent to which the decision enhances or reduces the system's reputation.
(5)	Diffusion	The extent of the impact of the decision on all parts of the system.
(6)	Education Standard	The "average" level of education given to the students.
(7)	Education Time	Impact on the compulsory length of time spent in education.

(8) Status	Effect on the status of the academic or teaching profession as a whole.
(9) Mobility	The expected mobility required of participants (i.e. teachers, headmasters, etc.) within the system.

B. Systems External to Educational System

(10) External Inaction	The consequences for all systems external to the educational system of not making a decision at all.
(11) Repercussion	The impact of the decision, taken within the educational system, or the external systems.

C. Effects on Resources

(12) Internal Cost	The amount of the educational decision-making systems' money needed to make the decision e.g. staff costs, architects' fees.
(13) External Cost	Money spent by other sub-systems in providing information e.g. studies by Ministry of Health on numbers of sectors affecting the decision to alter the scale of medical training facilities.
(14) Analysis Time	The duration of any data-collection, analysis or reflection needed for the decision.

(15) Participative Span	The number of people directly involved in some aspect or other of the decision-taking (from educational system and all external systems).

(By "directly involved" in this context is meant: those who actually have a "vote" when the decision is made.)

D. After the Decision

(16) Internal Cash Cost	The discounted cost (at some appropriate discount rate) of all system monies directly involved in the implementation of the decision, excluding the decision-making cost.
(17) External Cash Cost	The discounted cost of all external system monies directly involved in the implementation of the decision, excluding the decision-making cost.
(18) System Finance Ratio	The proportion of future system funds which will be required to be committed to execute the decision.
(19) Downward Involvement Span	The number of people (within the system) directly affected by the decision (excluding those involved in the decision-taking) who are below those in the system authority structure who were involved in the decision-taking.

(20) External Downward Span	The number of people (in the external systems only) directly affected by the decision (excluding those involved in the decision-taking) i.e. actively engaged in some aspect of it.
(21) Supervision	The amount of monitoring or control required following the decision (within the system or by external systems).
(22) Lifetime	The anticipated life of the subject of the decision.
(23) Minimum Duration Time (MDT)	The shortest time which must elapse before a decision, which has been taken and implemented, is eligible for review AND modification or abandonment, whether its consequences be favourable or unfavourable.
(24) Probation Time (PT)	The period after which the implemented decision becomes irreversible.

[(i) If MDT $\leqslant$ PT $\Longrightarrow$ reversal of the decision is possible

(ii) If MDT $>$ PT $\Longrightarrow$ system is committed from time decision is implemented.

Case (ii) may occur if feedback concerning results and repercussions of decision takes a great deal of time (i.e. $>$ PT to filter back to the decision-maker, due to poor information channels, organisational structure, etc.]

E. Miscellaneous Factors

(25) Precedent Setting	The possibility of setting unwelcome precedents by making a reasonable decision in a particular case.
(26) Money Penalty	The total cost to the system of making a mistake, i.e. the loss incurred as a result of the mistake, plus the cost of putting the mistake right (in purely financial terms).
(27) Inconvenience Penalty	The "inconvenience" to the system of making a mistake, i.e. ill feeling generated, etc.
(28) Money Revenue	The discounted revenue of all monies received following the implementation of the decisions.
(29) Originality	The extent to which the decision to be made is original, i.e. the number of times such a decision has or has not been taken before in the system.
(30) Information Base	The quantity, quality and accuracy of the information required to take the decision.
(31) Sanction	The amount of upward communication (if any) concerning the decision which is statutory before it can be taken.

(32) Expertise Level	The amount of specially qualified expertise or skills required before the decision can be made.
(33) Publicity	The extent to which a decision made by the system is of interest to the external systems.
(34) Removal	The extent to which the decision-taker is the decision-implementor (i.e. whether the decision-taker actually implements the decision or it is transferred for implementation by someone else).
(35) Inform	The number of subsystems within the system which need to be informed of the decision in order that subsystem goal-congruence (i.e. the maintenance of subsystem goals in line with the corporate system goals) is ensured.
(36) Lateness	The penalty to the system from a decision being late with respect to factor (35).
(37) Frequency	The number of similar decisions per unit of time.
(38) Review Span	The existence and number of nodes which will or can review a decision.

B.4 The Concept of Decision Importance

Arriving at a list of factors and assessing the magnitude of the factor for a particular decision, forms the first part of the concept of the importance of a particular decision. The second part is that all factors are not of the same significance for all decisions. For example, consider two decisions:-

A. Whether or not to buy new copies of an existing basic text book used in secondary schools to replace copies which have worn out.

B. Whether or not to replace the same worn out books with a new book which is an improved way of presenting the subject matter.

For both A and B the magnitudes of the factors relating to cost, numbers of pupils affected and so on will be practically the same. However, for B the magnitude of the effect on educational quality will be greater and this aspect is likely to be relatively more important than the magnitude of the factor implies. This is because, for A, educational quality is expressed in terms of preventing a decline due to the lack of books as the old ones wear out, whereas for B, educational quality may be actually improved by the use of the better teaching material embodied in the new text.

We can deal with this situation by introducing the concept of a weighting factor. This will serve to inflate the actual magnitude to reflect the variation in relative factor importance between one decision and another. This will lead to a measure of decision importance, DI, such that

$$\text{DI} = \sum_{i} \text{Weight (i) x Magnitude (i)}$$

where the summation is carried out over all 38 factors (i.e. $i = 1,2...38$).

In the foregoing example the DI for decision B would be higher than that for A by more than the difference in magnitude on the educational quality factor. The implication would be that a B-type decision would have to be referred to a higher grade of official than an A-type, and not necessarily that choice B is to be preferred to choice A.

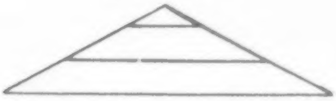
The careful reader will notice that, as the example has been expressed, the choice is not between A or B, but in each case it is a yes/no decision. In practice we should have to allow for a third type of decision which would be:

C. Whether to replace the books by the existing text, the new one, or not at all.

This is a more complicated decision, and will not be dealt with further, as the purpose of this section is to suggest, by simple examples, an area for exploration rather than to describe a fully developed tool.

Since these are new ideas, it may be worthwhile to remind the reader of the distinction between staff work and decision-making, which we made earlier, and to point out that the essence of the concept of decision importance is its contribution to organisational design, i.e. to the problem of deciding which grade of official should be empowered to deal with the various classes of decision.

The magnitudes and weightings scheme implies that the higher the absolute score which a decision receives, then the more important the decision is likely to be. Consequently the more important the decision then the higher up in the system hierarchy the decision should be made. This, in turn, indicates that a one-to-one correspondence exists between decision importance and hierarchy level, thus given the total score (i.e. the additive of all factor scores thought to affect the decision), for a particular decision importance assessment, then this automatically specifies the lowest level at which the decision could be made, since each hierarchy level is defined by some particular interval.

e.g. Score	Hierarchy	Grade of Officer
Over 600		Level 1
200 - 600		Level 2
0 - 200		Level 3

Thus if a decision "scored" 360 then this implies that a decision-maker on "level 2", or above, should make the decision.

It will, therefore, be necessary to fix some interval scores for the various existing or proposed hierarchy levels. This problem is discussed below in Section II.

B.5 Proposed Scheme of Measurement

A simply additive approach of measurement seems to be an adequate method of attempting to measure decision importance, and with this as a base a measurement technique is proposed and will be illustrated later.

It is proposed that each of the 38 factors listed be measured by one of three types of scale:

(i) Detriment/Benefit Scale
(ii) Numerical Scale
(iii) General Scale

Three scales are needed because it would be impossible to produce only one general single scale capable of assessing the magnitudes of each of 38 factors.

In practice, the three scales are essentially similar in their mathematical effect and in the numerical magnitudes used. The difference between them lies in the nature of the factor being measured.

(i) DETRIMENT/BENEFIT SCALE

Assumptions

There are two assumptions on which the use of this scale for assessing individual factor importance is based:

1. Each factor is capable of being assessed in terms of its detriment or benefit on the system and/or external systems,

and

2. That the greater the perceived detriment or benefit arising from this factor then the more important is the associated decision expected to be.

Method

It will be necessary to define the particular levels of detriment or/and benefit separately for each factor, but the actual numerical scores or magnitudes assigned to the various levels will be the same for all factors.

In addition, it is also suggested that three levels of detriment and three levels of benefit are sufficient for each factor (where necessary). As the level of detriment or benefit "increases" so the allotted score to each level correspondingly increases.

The factors which it is felt should be measured by this particular scale include factors from the "consequences" and "miscellaneous" categories:-

Consequences Category

(1) Local-flexbility
(2) System-flexibility
(3) Internal Inaction
(4) Reputation
(6) Education Standard
(8) Status
(10) External Inaction

Miscellaneous Category

(25) Precedent Setting
(26) Money Penalty
(27) Inconvenience Penalty
(36) Lateness

Examples

(1) Local-flexibility

→ Direction of increasing detriment

and the associated scores may be:

Small Reduction	Moderate Reduction	Substantial Reduction
1	2	3

(6) Education Standard

→ Increasing detriment

Minor Fall	Large Fall	Very Large Fall
1	2	3

→ Increasing benefit

Minor Improvement	Large Improvement	Substantial Improvement
1	2	3

(If there is no expected change in benefit and detriment, then a score of "0" is given i.e. implying the factor is irrelevant.)

Comments

(1) Once the levels of benefit or detriment for each factor have been determined then they remain fixed for all repetitions of that decision.

(2) Implicit in the factor level determination and scoring is a certain amount of subjective judgement. However, it is hoped that certainly for this section, that, for example, considering the factor "education standard", that any fall in the standard would be universally regarded as detrimental and, similarly, considering the factor "local-flexibility", that any reduction in the future decision-making freedom of a decision-making node again would also be regarded as detrimental.

(ii) NUMERICAL SCALE

Assumptions

(1) All factors of this section are capable of being easily quantified, e.g. costs, time, etc.

(2) That the greater (or in some cases smaller) the numerical value of the factor then the more important is the associated decision.

Method

Each factor will have uniquely defined levels but again the scores assigned to each relative level will be the same for all factors.

It is proposed that four levels should be used to describe each factor. As the level of numerical magnitude increases (or decreases) so the allotted score to each level should increase.

Factors to be measured using this scale include those from the "resources" and "miscellaneous" categories:-

Resources Category

(10) Internal Finance Cost
(13) External Finance Cost
(14) Analysis Time
(15) Participative Span
(16) Internal Cash Cost
(17) External Cash Cost
(18) System Finance Ratio
(19) Downward Involvement Span
(20) External Downward Span
(22) Lifetime
(23) Minimum Duration Time
(24) Probation Time.

Miscellaneous Category

(28) Money Revenue
(37) Frequency
(35) Informed
(38) Review Span

Examples

(22) Lifetime

Factor:	0-3 mths	3-6 mths	6 mths - 1 yr.	1 yr. plus
Score :	1	2	3	4

⟶ Increasing time magnitude

Comments

(1) Once the levels of magnitude for each factor have been determined then they remain fixed as before.

(iii) GENERAL SCALE

This scale is designed for those factors the levels of which cannot be easily quantified, nor which can be assessed in terms of their respective detrimental or beneficial effects. The resultant scale is, therefore, qualitative in nature.

Assumptions

(1) The levels of the factors are used to measure "degree" and it is assumed that the greater the degree then the more important the associated decision.

Method

Each factor has a unique set of levels, with each level either increasing or decreasing the "degree" of the associated factor. As before the scores attached to the levels are the same for all factors.

The number of levels for any particular factor will vary, but it is suggested that either 3, 4 or 6 levels be used (as in the detriment/benefit and numerical scalings).

Factors to be so measured come from all three categories and are:-

Consequences Category

(5) Diffusion
(7) Education Time
(9) Mobility
(11) Repercussions

Resources Category

(21) Controllability

Miscellaneous Category

(29) Original
(30) Information Base
(31) Sanction
(32) Expertise Level
(33) Publicity
(34) Removal

Examples

(9) Mobility

⟶ Increased "degree"

Slightly Reduced	Moderately Reduced	Substantially Reduced
1	2	3

⟶ Increased "degree"

Slightly More	Moderately More	Substantially More
1	2	3

(Note: 6 levels)

(31) Sanction

⟶ Increased "degree"

Very Little	Fair Amount	A Lot	Substantial
1	2	3	4

(Note: 4 levels)

(If the decision leaves the particular factor as prior to the decision then an "0" score is assigned to that factor.)

Comments

(1) Levels of each factor fixed.

(2) The subtle difference between measuring a factor by the general, rather than by the detriment/benefit scale, is that in the former case, it is impossible to conclude whether changes in a particular factor would be universally accepted as detrimental or beneficial, e.g. should a decision which increased the expected mobility of teaching staff imply benefit or detriment to the corporate system? Whereas, in the latter case, changes in a factor can easily be categorized as detrimental or beneficial e.g. education standard.

B.6 Weighting Factors

The calculation of importance is to be completed by multiplying the factor magnitude by a weighting co-efficient. These co-efficients cannot be constant and must vary from one decision to another. A non-linear scale is suggested:-

Weighting Co-efficient	Meaning
0	Factor is trivial
1	Factor is fairly serious
2	Factor is important
10	Factor is exceedingly important

These co-efficients would have to be arrived at for each factor and for each possible decision in the system. They would also depend on the type of decision. For example, if the decision to appoint a headmaster is being taken for routine purposes, such as merely to fill a vacancy caused by retirement, the factor of lateness might have a weighting co-efficient of 1 or 2. If, on the other hand, a headmaster is to be appointed to a school which has seriously deteriorated due to a previously incompetent incumbent, then lateness might assume considerable weight.

The net effect of this rather primitive approach is that, if there are 38 factors, and the magnitude and weighting co-efficients both have a maximum value of 10, then a particular decision could 'score' from

101

0 to 3800 points. It seems implausible that all factors should have a maximum weighting co-efficient of 10 but, for the present, we are merely seeking to outline an idea and it is better to keep the arithmetic simple.

The implications of the use of this scale for the design of an organisational and control system are that decisions which have low scores can be allowed to be taken lower down the hierarchical ladder than those which have very high scores.

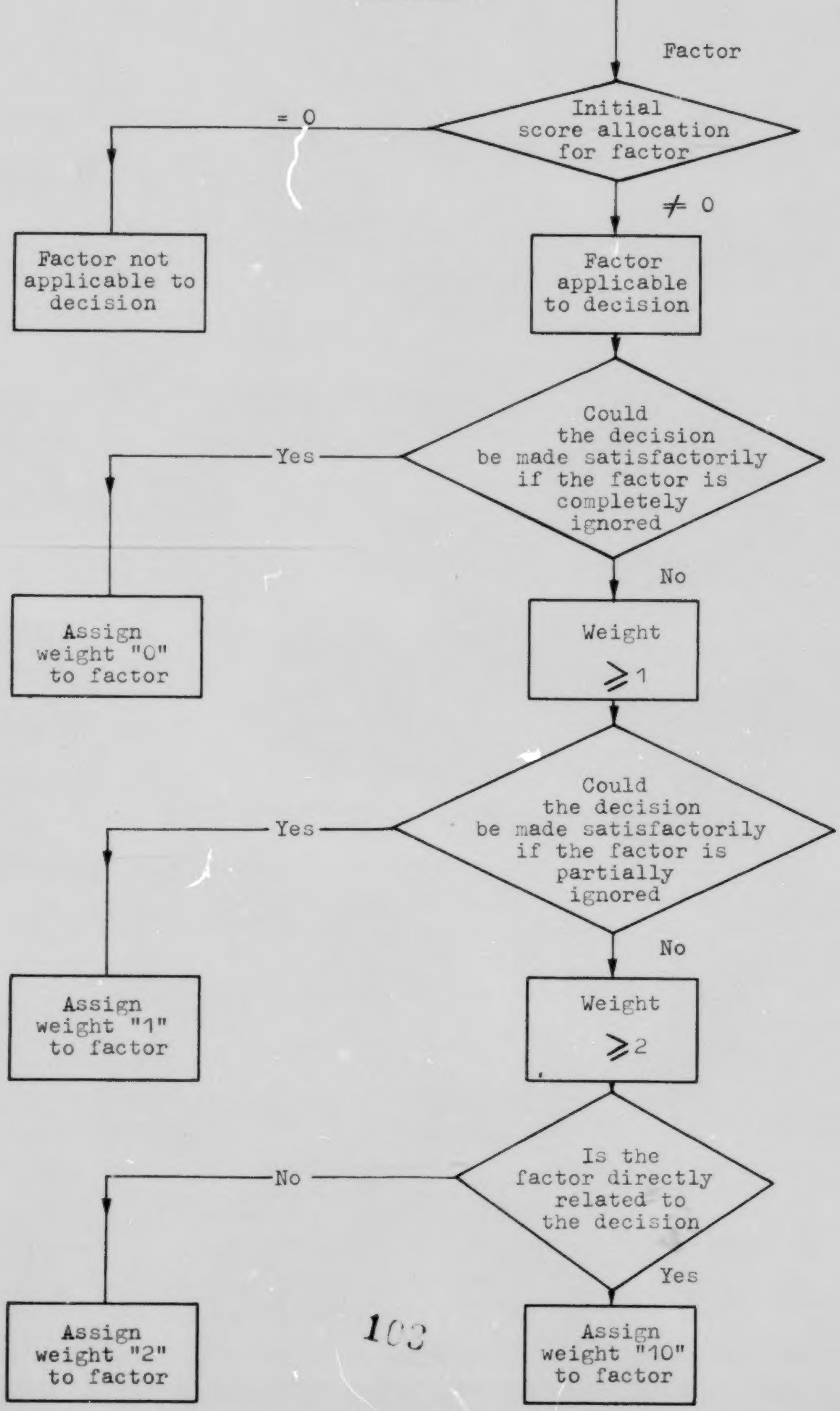
A possible area of difficulty, however, could be in attempting to decide for each factor its (i.e. the factor's) degree of importance and consequently the appropriate weighting co-efficient to apply. It is, therefore, suggested that it may be useful to have some sort of "check-list" against which each factor can be assessed for each decision, or some sort of "sifting" technique so that the more sifting gates the factor passed through the more importance (i.e. a higher weighting co-efficient) is attached to it. Fig. 1 is a very simple and crude device for assessing importance on the scale we have suggested.

Comment

The scheme which has been outlined can be regarded as no more than an initial proposal. Certainly it requires refinement and formalisation before it can be fully accepted. Too much refinement must, however, be avoided as the scheme is intended to provide a simple tool rather than an exact one.

In the remainder of this section we shall discuss an example of the measurement of decision importance and, in the following section, we shall consider an approach to the use of the measure of decision importance in the design of decision-making systems.

FIGURE 1


Factor
Initial score allocation for factor
= 0
≠ 0
Factor not applicable to decision
Factor applicable to decision
Could the decision be made satisfactorily if the factor is completely ignored
Yes
No
Assign weight "0" to factor
Weight ⩾1
Could the decision be made satisfactorily if the factor is partially ignored
Yes
No
Assign weight "1" to factor
Weight ⩾2
Is the factor directly related to the decision
No
Yes
Assign weight "2" to factor
Assign weight "10" to factor

B.7 Some Examples of the Measurement of Decision Importance

In order to show how the method of assessing decision importance works in practice, two examples were taken and analysed. The examples were chosen almost at random from the decision flow charts produced for the study of the Greek educational system.

The flow charts are referred to here by their original numbers.

The activity flow charts are reproduced **in Appendix A.**

They were:-

> 3.1.2, which was taken to refer to activity 1.1.1.1.2, the establishment of a higher technical school (it actually describes a further 7 activities, but only one was used for this example),
>
> and
>
> 1.4.7, which was used to illustrate the appointment of a tutorial assistant, activity 4.1.2.1.2, (the chart also describes renewal and promotion activities for an assistant, but these are not used in the example).

These two flow charts both show more than one decision and, in each case, the measure of important (MI) is calculated only for that part of the decision process which takes place within the Ministry of Education.

The full range of the 38 factors has been applied, with some simplification, since it cannot yet be contended that the factor list is fully developed, and, therefore, there is no point in over-elaboration when the purpose is merely to illustrate.

The simplification is that the magnitude of each factor is rated at only five levels with scores of

Score	Magnitude
0	Nil or no change
1	Small
2	Moderate
3	Large
4	Very Large

If the idea of the MI proves to be viable, then it will be necessary to work out improved magnitude scales, precisely defined, and to take advantage of the idea of using three scales. The simplification used here makes the scales indistinguishable, but they are mentioned for completeness, in Table 1, which shows the calculation.

The weights have been assigned using a scale of 0, 1, 2 and 10, and applying Fig. 1 to help in deciding on the weight. Although the magnitudes and weights used in Table 1 seem vaguely plausible, no serious attempt is made to defend them, for two reasons. Firstly, because they vary from educational system to educational system and only the Greeks know enough about the situation to decide on the values to be used for the Greek educational system. If the MI is to be used in the project, they will have to go through all the charts and work out magnitudes and weights for each decision node. In the second place, the ideas on which the factors were based have not yet been worked out in enough detail.

However, and purely as an illustration, Table 1 shows that the establishment of a school has an MI of 509, and the appointment of an assistant has an MI of 141. This does not mean that the first decision is 509/141 = 3.61 times as important as the second. It does, however, imply that there is no need for a decision, with the relatively low 'load' of 141, to be taken by an official of relatively high 'power'.

TABLE 1

SAMPLE CALCULATION OF RELATIVE IMPORTANCE FOR TWO DECISIONS

Factor		Activity 3.1.2. Establishment of a Higher Technical School			Activity 1.4.7 Appointment of a Professor's Assistant		
Number and Description	Type of Scale*	Magnitude (M)	Weight (W)	I = M x W	Magnitude (M)	Weight (W)	I = M x W
1. Local Flexibility	D	2	2	4	1	0	0
2. Systems "	D	1	2	2	0	0	0
3. Internal Inaction	D	3	10	30	0	0	0
4. Reputation	D	1	0	0	1	0	0
5. Diffusion	C	1	2	2	0	0	0
6. Education Standard	D	2	10	20	1	10	10
7. Education time	C	0	0	0	0	0	0
8. Status	D	0	0	0	0	0	0
9. Mobility	C	1	1	1	0	0	0
10. External Inaction	D	3	10	30	0	0	0
11. Interference	D	0	0	0	0	0	0
12. Repercussions	C	3	10	30	0	0	0
13. Internal Finance Cost	N	1	10	10	0	0	0
14. External Finance Cost	N	0	0	0	0	0	0
15. Analysis Time	N	2	2	4	1	1	1
16. Participative Span	N	2	10	20	1	2	2
17. Internal Cash Cost	N	3	10	30	1	1	1
18. External Cash Cost	N	0	0	0	0	0	0
19. System Finance Ratio	N	2	10	20	1	1	1

* D = Detriment/Benefit, C = Consequences and N = Numerical

TABLE 1 (Continued)

Factor		Activity 3.1.2 Establishment of a Higher Technical School			Activity 1.4.7 Appointment of a Professor's Assistant		
Number and Description	Type of Scale*	Magnitude (M)	Weight (W)	I = M x W	Magnitude (M)	Weight (W)	I = M x W
20. Downward Span	N	2	10	20	1	2	2
21. External Downward Span	N	3	10	30	2	10	20
22. Controllability	C	2	2	4	0	0	0
23. Lifetime	N	3	10	30	1	2	2
24. Minimum Duration Time	N	0	0	0	2	2	4
25. Probation Time	N	4	10	40	2	10	20
26. Precedent Setting	D	0	0	0	2	10	20
27. Money Penalty	D	3	10	30	1	10	10
28. Inconvenience Penalty	D	2	10	20	1	2	2
29. Money Revenue	N	0	0	0	0	0	0
30. Originality	C	0	0	0	0	0	0
31. Information Base	C	3	10	30	1	10	10
32. Sanction	C	2	10	20	1	10	10
33. Expertise Level	C	2	10	20	1	10	10
34. Publicity	C	2	10	20	0	0	0
35. Removal	C	0	0	0	0	0	0
36. Informed	N	2	0	0	0	0	0
37. Lateness	D	3	10	30	10	10	10
38. Frequency	N	1	10	10	4	1	4
39. Review Span	N	2	1	2	2	1	2
Total 'Score'				509			141

* D = Detriment/Benefit, C = Consequences and N = Numerical

II. Analysis of Decision-Making Hierarchies

In Section I we argued that all decisions are not of the same importance, and we suggested ways in which 'importance' might be assessed. We now examine the complementary problem that not all decision-makers are of the same importance, nor do they all have the same degree of 'power'.

The concept of 'power' is even less easy to define than that of importance. The implications have not yet been fully elaborated but the basic reasoning is as follows.

(i) A decision-making hierarchy is a series of layers of officials.

(ii) Each layer has its own level of authority, to the extent that it may be permitted to decide, by itself, on some issues, but more important matters must be referred upwards. This is a reflection of the degree of autonomy possessed by a decision-making sub-system.

(iii) Each layer is staffed by people of roughly the same level of ability in the sense of their being able to make the proper choice from the alternatives for the decisions they are empowered to take.

(iv) 'Power', is, for our purposes, some kind of ill-defined mixture of the attributes of (ii) and (iii).

(v) Each time period (year ?), the decision-making hierarchy has to make many decisions of varying levels of importance.

(vi) The problem is, therefore, to specify the degree of autonomy to be granted to each level in the hierarchy of decision-makers and to determine how many decision-makers will be needed at each level in order for the system to operate adequately. Clearly there are likely to be problems inherent in this approach as there are other sub-systems, such as Universities which have their own autonomy. However, the purpose of the present exercise is to analyse decision-making within the Ministry of Education and it is only with decisions taken there that we are concerned.

The problem is far more complicated than this, and therefore, in this section no more than a preliminary attempt is presented to pose a problem, the solution of which may be of some importance, though beset with appreciable difficulties.

We may, however, at least approach the problem by developing a simple mathematical model.

We first define some symbols.

$l_j \quad j = 1 \quad \ldots \quad N_L$	the j^{th} level in a serial hierarchy containing N_L levels.
$P_j \quad j = 1 \quad \ldots \quad N_L$	the number of 'equal' decision-makers or decision-making groups at each hierarchial level.
$d_i \quad i = 1 \quad \ldots \quad N_D$	the importance of each decision in a system in which there can be up to N_D possible different decisions.
$p_i \quad i = 1 \quad \ldots \quad N_D$	the numbers of each decision required each time period. The length of the time period should ideally be such that it will contain at least 1 of each possible decision. As a practical matter it might be necessary to restrict the time period to some natural length such as the budgetary or academic year or the 5 year plan. This may involve excluding from consideration some members of the set of all possible decisions, S_D, which occur so infrequently as to call for special treatment. An example would be the decision to establish a new university. Note that N_D is the measure of S_D.
$C_j \quad j = 1 \quad \ldots \quad N_L$	the importance (measured in the same units as d_i) of the decisions which one chooses to allot to l_j.

$K_j \quad j = 1 \ \ldots \ N_{L-1}$ the upper limit of the importance of the decisions which can be allotted to l_j clearly

$$K_j \leqslant \hat{d} \qquad j = 1 \ \ldots \ N_{L-1}$$

and $K_{N_L} = \hat{d}$

where $\hat{d}$ is the highest score that $\hat{d}$ can attain. For a serial hierarchy,

$$P_{N_L} = 1$$

(there is 1 top man or group - the Minister or the Cabinet).

The total load on the system is

$$L = \sum_{i=1}^{N_D} d_i \, p_i \qquad (1)$$

The total decision-making 'power' of the system is

$$\Pi = \sum_{j=1}^{N_L} P_j \, C_j \qquad (2)$$

and the necessary condition for complete operation of the system, in the sense that all required decisions will be taken, is obviously

$$\Pi > L \qquad (3)$$

The strict inequality must be used from considerations of queueing theory and the traffic intensity theorem. This can be written as

$$\sum_{j=1}^{N_L} P_j(K_j - C_j) = \sum_{i=1}^{N_D} d_i \, p_i \qquad (4)$$

where $(K_j - C_j)$ is a measure of surplus decision-making 'power' at l_j.

We may also put

$$(K_j - C_j) \geqslant s_j \qquad (5)$$

where s_j reflects some concept of required surplus capacity which could be defined in terms of the traffic intensity at l_j [consider the implications of the time-dependent factors (e.g. factor 22) bearing in mind Parkinson's 'Law' that work will expand to fill the time available for it].

The problem now has several aspects

(a) to find the values of P_j required to operate the system
and/or

(b) to choose an appropriate N_L
and/or

(c) given K_j and s_j to find O_j from equation 5 which will satisfy conditions 3 or 4 and then to re-check points (a) and (b)
and/or

(d) given P_j and N_L to find values for K_j, C_j and s_j which will satisfy the conditions

and so on in order of increasing freedom of the solution.

Raising the level of freedom of the solution will probably make some of these options mutually exclusive, but, as was pointed out, these ideas are very tentative.

The ideas put forward in this 'model' can be stretched a little further. We may write a series of constraints for the l_j of which the j^{th} would be

$$\left.\begin{array}{ll} & P_j \, C_j \geqslant \sum_i d_i \, p_i \quad \text{where} \\ & i \in S_D \; ; \quad C_{j-1} \leqslant d_i \leqslant C_j \\ \text{and} & C_j \leqslant K_j \\ & C_{j-1} \leqslant K_{j-1} \end{array}\right\} \qquad (6)$$

Note that $C_j \geqslant K_{j-1}$ is not necessary.

This set of constraints could be programmed to aid the solution of problems (a) - (d) referred to earlier. The solution should be by simulation and the temptation to invent some kind of objective function and to 'optimise' the system by linear (or, in fact, quadratic) programming should be firmly resisted!

PORTUGAL

FOREWORD

This report summarises the work carried out under a special project set up by OECD and the Ministry of National Education of Portugal, to undertake a systematic assessment of the financial, human and material resource implications of introducing a new educational system.

The work reported here was carried out during 1972 and early 1973, and gives results as available in 1973. The development of an educational system is of course an ongoing process, and some of the results presented have already been overtaken by events. Nevertheless, it is suggested that the methods developed during this project are appropriate for medium and long term planning of educational systems. The value of the report, therefore, is as much in the methodology used, as in the numerical results given.

The project was controlled and organised by the Planning Unit within the Portuguese Ministry of National Education (G.E.P.A.E.), whose staff carried direct responsibility for the work. Among the major contributors were:

- Professor Frausto da Silva - (former Director of G.E.P.A.E.)
- Eng. Adelino da Costa - (formerly Deputy Director of G.E.P.A.E., and now Director, and leader of the project)
- and Mrs. Teresa Ambrósio - (Head of Planning Department),

who were responsible for the overall organisation of activities, and the design and leadership of the project.

On specific points of the project, reference must be made to the contributions of:

- Miss Maria Emilia Freire - on financial resource studies and manpower forecasts,
- Mr. J.P. Martins Barata - on physical resource requirements and location studies,
- Mr. Vitor Anunciada and Mr. Roberto Carneiro - on student flows,
- Mr. Abel Mateus - on macro-economic studies and their educational implications,
- Mrs. Antonieta Rodrigues - on capital expenditures,
- and Mr. Ferreira de Castro and Mr. Paulo Bárcia - on other detailed studies.

Outside the staff of G.E.P.A.E., much support for the work, and guidance on practical and political aspects of the project was given by other officials of the Ministry of Education, including the Minister himself, Professor Veiga Simao.

Acknowledgements are also due to the co-operation and support given by the Secretariat of OECD, through the Directorates of Scientific Affairs and Technical Co-operation.

SUMMARY AND CONCLUSIONS

This report is concerned with estimating the resource implications of introducing a new Educational System in Portugal. The revision proposed was a major one, covering changes from Nursery School to Higher Education, in internal structuring at various levels, and giving different routes through the system. Also involved was an extension of the period of compulsory schooling, and a reorganisation of Teacher Training facilities and other vocational programmes. The Educational System existing in 1971, and the new projected system are depicted in diagramatic form in Figures 1 and 2. The time scales envisaged for the various changes varied somewhat, but of immediate importance were the initiation of changes in teaching training in the mid 1970's, and the extension of the minimum schooling period by 1979.

Furthermore, the study was carried out during the Planning phase for the National Development Plan covering the years 1974-79. Thus the resource requirements for education up to 1979 had to be established by mid 1973, only some 2 years after initial plans for the revised Education Systems were published.

The project was carried out during 1972 and early 1973. The urgency of the task, plus the inevitable modifications which were made as the characteristics of the proposed system were debated, had fundamental effects on the methodology employed in the study. This is discussed in Chapters 1 and 2, where the parallel activities of development of the system, and the planning process are underlined, and the necessity for the pragmatic approach stressed.

The overall scope of the project, and an examination of its methodology in a systems analysis framework are also discussed in Chapter 2, in which Figure 4 highlights the interactions between the many factors involved, both within and without the Educational System. Stemming from this, the basic sub-systems which had to be studied in detail are identified.

The structure of the models used to evaluate these sub-systems is considered in Chapter 3. Detailed studies of student flow models under the new system are described,and the effect of different rates of transition from the existing to the new system are explored.

Parallel studies of the supply and demand for teachers,under different assumptions concerning teaching ratios, and extent of T.V. schooling are next explored, and the close interaction between student and teacher numbers is highlighted.

Finally, in Chapter 3, the models used for estimating capital and current expenditures on resources generally are described.

Chapter 4 is concerned with the application of the models developed in Chapter 3 to the particular situation in the period 1974-1979. Separate sections show the results obtained for student numbers, teacher supply and demand, and capital and current expenditures.

The principal results are given in Tables as follows:

Students numbers	Tables 3, 4, 5, 8, 10, 11, 15* (* an overall Summary Table)
Teacher supply & demand	Tables 16, 17, 18, 19, 20.
Capital Costs	Table 22.
Current Expenditure	Tables 23, 24, 25, 26, 27.

Perhaps the most significant point to emerge from the results was the very close interrelationship of the new system, and the requirement for teachers at school level - affecting both the establishment of new teacher-training facilities, and of retraining programmes . This latter aspect is particularly influenced by the population projections, for substantial changes in trends were forecast. The combined effect of these projections, and the institution of the new Educational System showed dramatic changes over time in the teacher requirements for different levels of education. The (always recognised) importance of securing adequate teacher supply was given a numerical base.

Also included in the Report are a number of Appendices, concerned with particular special studies - some within the mainstream of the project, and others providing a further background dimension to the analysis.

Thus • Appendix A discusses in detail the methods used to lessen the 'transitional' impact of introducing the new system.

• Appendix B describes an analysis of qualified manpower forecasts, for use in judging the required development rate of the Higher Education Sector.

• Appendix C deals with the particular problem of where to locate the new Universities envisaged, taking account of both National and local factors.

- Appendix D shows how one aspect of the analysis could be handled by formal optimising methods, though the results are not utilised in the results quoted in the main body of the report.

- Appendix E explores an interesting method of using system dynamics to ease the taks of forecasting student numbers by level of education under various demographic and system change effects.

The presentation of the methodology employed, the models used, and the results obtained is of course the main purpose of this report.

But in conclusion, the following points seem worthy of mention:

- usefulness : the study was clearly of value both within the Ministry of National Education and in influencing Governmental planning generally. It helped to focus attention on, and to quantify, the most significant problems ahead in addition to providing realistic estimates of resource requirements.

- qualifications: as discussed in Chapters 1 and 2 particularly, the accuracy of such an analysis rests heavily on the availability of relevant data. In the study reported here, a significant statistical survey carried out prior to the project provided a useful basis, though some potentially useful data was not collected. Clearly such surveys should attempt to anticipate the uses to which its results might be put, and to eliminate obvious deficiencies. But perhaps more importantly, the value of the results depends on the allowances of the many foreward forecasts involved - of population, the extent and nature of education sought beyond the compulsory stages, future recruitment into the teaching profession, etc.. Several individual studies (e.g. Appendices B and C) were conducted to shed light on such problems, but a significant scope for errors still exists - and will always exist in such planning exercises.

- further work: throughout the project (and reflected in this report) the ongoing nature of the work has been an important factor. But the methods developed, and reported here can be re-applied as more data becomes available, and as any further modifications to the structure of the Educational System are introduced. The project has therefore provided an analytical framework within which the results be continuously revised, keeping the planning activity closely linked to the realities of the developing situation.

CHAPTER 1

INTRODUCTION

1.1 Re-modelling the Portuguese Educational System

Over the last decade or so, educational systems in many countries throughout the world have been reassessed, and in many cases, substantially restructured, to make them both better able to serve the changing educational and social demands and to reflect modern educational methods.

Portugal has been no exception to this trend, and in the late 60's a comprehensive examination of the existing system was conducted, from primary education to higher degree level. Analyses were made of changing patterns of education in other countries and of the likely social and economic developments within Portugal which would of course determine the environment within which the educational system would have to function.

Resulting from this, the Ministry of National Education published, in 1971, a White Paper entitled "Projected Educational System", as the first stage of a public dialogue designed to encourage comments on these proposals from all sections of the community. The main aims of the new system proposed were to secure:

- expansion, individuality and diversity in education
- accessibility to successive levels of education
- effective inter-relationships between the various sectors of secondary and higher education
- development of vocational aspects
- relationship with social demand.

It was stressed that, though important, the demands of economic development in the educational system should be kept in perspective, and should not be allowed to dominate the main purpose - i.e. the education of the individual.

It was also noted that any educational system should be able to adapt to changing circumstances, and the proposals were put forward as the initial phase of what was likely to be a continuing process of innovation and expansion.

Among the actual changes proposed to achieve the aims listed above were:

- creation of State pre-primary education;
- lowering of the age-limit for compulsory school attendance in the primary school to six years of age;
- addition of one year to the secondary course, to include two stages, each of four years' duration;
- unification of studies in the first stage of secondary education;
- extension of compulsory school attendance to eight years, that is, till the end of the first stage of secondary school, which would normally be reached at the age of 14;
- abolition of the entrance examination to enter higher education;
- elimination of special intermediate schools;
- creation of polytechnics and other specialized institutions of higher education;
- generalisation of bachelor's degree in higher education institutions;
- creation of Departments of Education in the universities and the setting up of a new system of training of secondary school teachers;
- ability to continue studies up to Masters degree level from various routes available to Bachelor's degrees.

Diagramatic outlines of the Educational System as it existed in 1971, and as proposed in the "1971 White Paper" are shown in Figures 1 and 2.

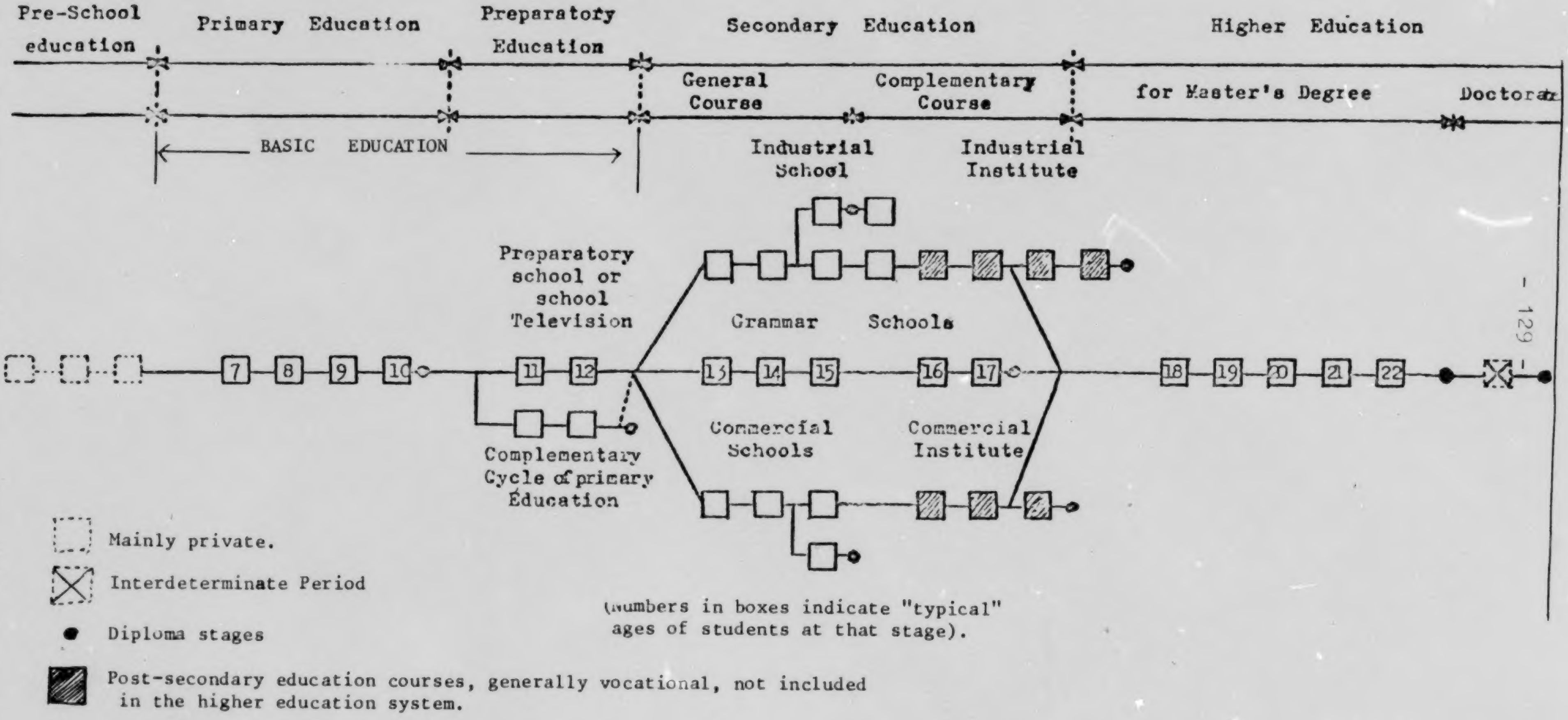
1.2 Resource Implications of the new System

The design of the new system made no explicit reference to the human, material and financial resources required to implement it. The political, economic and social conditions were appropriate for such a change, though it was acknowledged that significant additional resources would be required.

Indeed, additional resources were necessary in the education sector in any event, for the educational system was already under pressure. In fact, although the new system proposed as a major element, the extension of compulsory schooling to 8 years, even 6 years compulsory schooling (although decreed several years previously) had not been universally established in 1971.

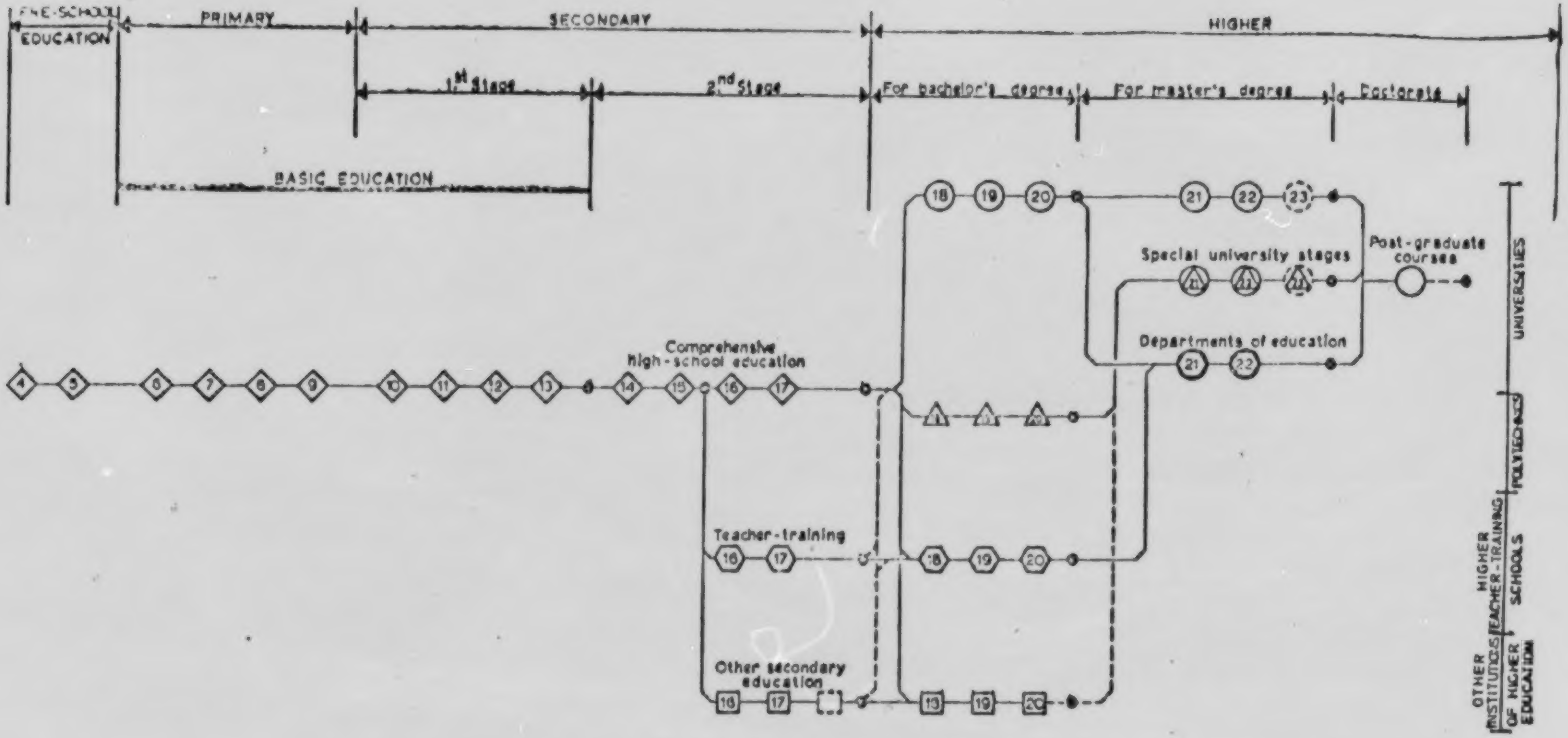
In school buildings, for example, one major source of pressure was the imbalance in population growth between the various regions of Portugal - essentially a drift from the interior and largely rural regions to the rapidly developing coastal sectors from Setubal to Oporto, where employment opportunities were much greater.

FIGURE 1 - PORTUGUESE EDUCATIONAL SYSTEM IN 1971


Pre-School education
Primary Education
Preparatory Education
Secondary Education
Higher Education
General Course
Complementary Course
for Master's Degree
Doctora
BASIC EDUCATION
Industrial School
Industrial Institute
Preparatory school or school Television
Grammar Schools
Commercial Schools
Commercial Institute
Complementary Cycle of primary Education
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
Mainly private.
Interdeterminate Period
Diploma stages
Post-secondary education courses, generally vocational, not included in the higher education system.

(numbers in boxes indicate "typical" ages of students at that stage).

FIGURE 2 - PROPOSED NEW PORTUGUESE EDUCATIONAL SYSTEM


PRE-SCHOOL EDUCATION
PRIMARY
SECONDARY
HIGHER
1st Stage
2nd Stage
For bachelor's degree
For master's degree
Doctorate
BASIC EDUCATION
Comprehensive high-school education
4 5 6 7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23
Special university stages
Post-graduate courses
Departments of education
Teacher-training
16 17 18 19 20
Other secondary education
16 17 18 19 20
UNIVERSITIES
POLYTECHNICS
HIGHER TEACHER-TRAINING SCHOOLS
OTHER INSTITUTIONS OF HIGHER EDUCATION

- Diploma Stages (Number in boxed indicate "typical" ages of students at that stage).

Shortages of teachers, particularly in some regions and for certain levels of education, was another current problem. This was one reason for the widespread and successful development of the school television service which supplemented classical teaching methods in both rural and urban districts. For in the way in which this system was used, less well qualified class-room staff were necessary. As will be seen in Figure 2, specific programmes for teaching training, to different levels of expertise, were an integral part of the new education system proposed. Indeed, a rapid increase in the production of trained teachers was a necessary prerequisite to the viability of the total system proposed.

Thus the current stresses, together with the additional requirements of the new system, represented an enormous demand for resources of all types. The rate at which the new system was to be introduced would clearly be significant in determining the resource requirements over the succeeding years. At the time the initial plan was published, no time scale for implementation had been established. But by 1972, it was agreed that parts at least of the new system should be fully implemented by 1979 - the end of the next 6 year planning period of 1974-9 on which Portugal's National economic planning was based. In particular, it was agreed that the extension of compulsory schooling to 8 years for all children should be established by that date - a critical decision in determining the total demand for education at the school level, and involving, of course, the greatest number of pupils. Implementation dates for the other parts of the plan were not fixed at that stage, apart from recognising the need to make an early start in setting up the first of the new teachers' training colleges envisaged in the plan. Such a move, of course, was essential to provide the additional teaching staff required, particularly in the extension of the secondary education sector, and it was decided that the first teachers' training colleges should become operational in 1973.

1.3 The Planning Process and the Scope of the Project

With the significant changes proposed, it was clearly necessary to complement the discussions on the form of the new system (as initiated by the publication of the White Paper) by assessments of the feasibility of alternative implementation schedules, and the associated resource requirements.

Major responsibility for this task was carried by the Research and Planning Group within the Portuguese Ministry of Education (GEPAE), under a special project agreed between O.E.C.D. and the Ministry of Education. The urgency of the task, as dictated by the few key implementation dates which were envisaged, meant that this analysis of resource requirements took place in parallel with the political and pedagogical dialogue. Thus, from time to time, decisions on various structural aspects of the new system and on the likely availability of total financial resources, became known - indeed they were often triggered by initial outputs from the resource estimation procedure.

Thus the appraisal process was (and is) an ongoing one, and indeed, even the results presented later in this report are subject to later revision.

Most of the analysis was in fact carried out during 1972 and early 1973, and as such is largely based on the plan as it existed in late 1971/early 1972. But as one example of a significant change which was later introduced, the Portuguese Educational Reform Bill of 1973 stipulated that the secondary school sector should be a single stream comprehensive system, although the 1971 White Paper had proposed parallel streams of classical, technical and artistic high schools - and the results given in this report reflect such a projected 'parallel' system.

But plans, of course, can rarely be regarded as static, and constant revisions are called for as circumstances change. Although, therefore, the results given as such do not match the current situation in all respects, the methods used for the planning study, as described below, are of no less interest.

As usual in studies of this type, a major constraint was the availability of data.

At an early stage of the re-appraisal of the Educational System, a massive statistical study had been carried out by the Ministry of Education, and was published as:

"The Portuguese Educational System
An Analysis of the present situation and its recent antecedents".

This provides a wealth of data up to 1970 on number of pupils and teachers, etc. at all levels of the system, to supplement the information already available within the Ministry. But as we shall see, and again as is inevitable in planning studies of this type, it was necessary to extrapolate the data for up to 15 years ahead. The significant changes within the Educational system itself, plus likely economic and social changes, makes this extrapolation no less hazardous than usual.

With all the above qualifications in mind, it was of course still essential to appraise the implications of the projected educational system on the demands for resources of various types, and to determine the feasibility and desirability of alternative implementation schedules within the constraints already fixed.

The terms of reference for the study were therefore taken as:

- The establishment of main objectives for the development of the educational system in the medium term.
- The setting of specific objectives for the period, 1974 - 80.
- The determination of the financial, human and material resource requirements to achieve these objectives.

The objectives for the system were, of course, to take into account the broader patterns of national, economic and social development, while the resource requirements would have to be related to the current availability, and feasible investment and development rates.

It should be noted that in this study we are only concerned with aggregate planning at the National level. Inter-regional differences are only taken into account with respect to their effect on aggregate requirements - so that, for example, differential population growths between the regions may affect the national requirements for teachers, and the average class-size which can be attained. But we are not explicitly concerned with planning at this regional level, nor with the detailed specifications for development of the school network. Indeed, the various regions may well adopt rather different philosophies of development, according to their own particular circumstances - though still, of course, working within the overall National legislation. Such detailed analysis was, in fact, carried on in parallel to the study described here by the planning staffs within the regions, but the results are not reported here.

As the White Paper makes clear, the new educational system was planned to introduce substantial changes at all levels of education. While the study has taken cognisance of this breadth of coverage, it was always clear that the greatest problems (in resource requirement terms) would be at the school level - at least during the early stages of implementing the 8-yr schooling period, and this is accentuated by the demographic projections. So much of the effort within the study was concentrated on the school level, and this is reflected in the material presented in this report.

Nevertheless, there is in Portugal, as in most other developing countries, significant pressure on the higher education sector, and there was, even in 1971, n obvious requirement for additional universities to be established. The location f such new universities is one particular problem which received special attention n the study, and it is presented here in Appendix C.

Other special analyses were carried out, as much to generate additional ackground material to influence the longer term developments of the educational ystem, as to directly influence the implementation process for 1974-80. Some of hese, too, are presented in the Appendices.

But the bulk of the material, the descriptions of the methods used, and of the esults presented in this report refer to the school sector.

Finally, we should again stress that the results are not to be regarded as efinitive - indeed, generated on 1971 data but referring to events up to 1979 and eyond, they could hardly be fixed. But they do represent an important step in determining possible implementation schedules and resource requirements, and in reating another base in the continuing pedagogical, economic and political debate mplicit in making the substantial revision to the Portuguese Educational System.

CHAPTER 2

METHODOLOGY

2.1 A Pragmatic Approach

The methodology adopted for the study was determined not only by the total scope and nature of the task, but also by the time scale involved. Thus, as we have already noted, the project was being carried out simultaneously with the development of the National Economic Plan for the period 1974-79, and there was no opportunity (even if it had been appropriate to do so) to conduct an analysis of the total implications of the introduction of the Projected Educational System in isolation from the National Economic Planning activity.

Thus one of the most important factors - that of the total financial resources which should be (or could be) made available was neither determined solely from the project - nor set as a fixed constraint ab initio.

Furthermore, the project was initiated at about the time the White Paper was published, and thus carried out during the period of debate on the characteristics of the new Educational System. Again, as pointed out in the introduction,some aspects of the system itself were modified before the Portuguese Reform Bill was introduced in 1973 (e.g. the change in the structure of the secondary school system).

For reasons such as these, it was necessary to plan at the outset of the study for continual cross-reference outside the project team, and outside the Ministry of National Education itself on both external constraints and on some of the internal characteristics affecting the design of the educational system.

Thus planning methodologies which might treat the educational system as a closed one were quite inappropriate. Attempts to deduce, from a purely economic base, what proportion of the Gross National Product should be applied to Education, and then to determine how the new system should be modified to fit within this limitation could not by themselves have been successful. Similarly abortive would have been pedagogical studies carried out in isolation, and specifying idealised designs without reference to the resource requirements.

The planning philosophy which was indicated was therefore necessarily concerned with the totality of the Educational System, and with its interactions with the external environment. At the same time it had to be pragmatic in its approach, with respect to the availability of data, the modifications of constraints and of structural aspects of the system - and, perhaps as important as any, with respect to the time-scale and effort available for the project.

Nevertheless, all the above considerations underline the essential interrelationships implicit in the study - and the appropriateness of a systems approach to the project was apparent.

2.2 The Systems Framework

In considering an overall design study of any system (in education or of any other) - the interactions between the various stages of the project can be depicted diagramatically as in Figure 3 below.

This shows the main external linkages to the outside world of

- the pressures of society in specifying the desired characteristics of the system;
- the availability of resources for the system, in financial, human and material terms;
- the outputs - of pupils at various educational levels.

In our context, these 'external' links are not fixed, as indicated earlier, but by embedding the educational system into a wider framework, which includes these external links, the rationale is preserved.

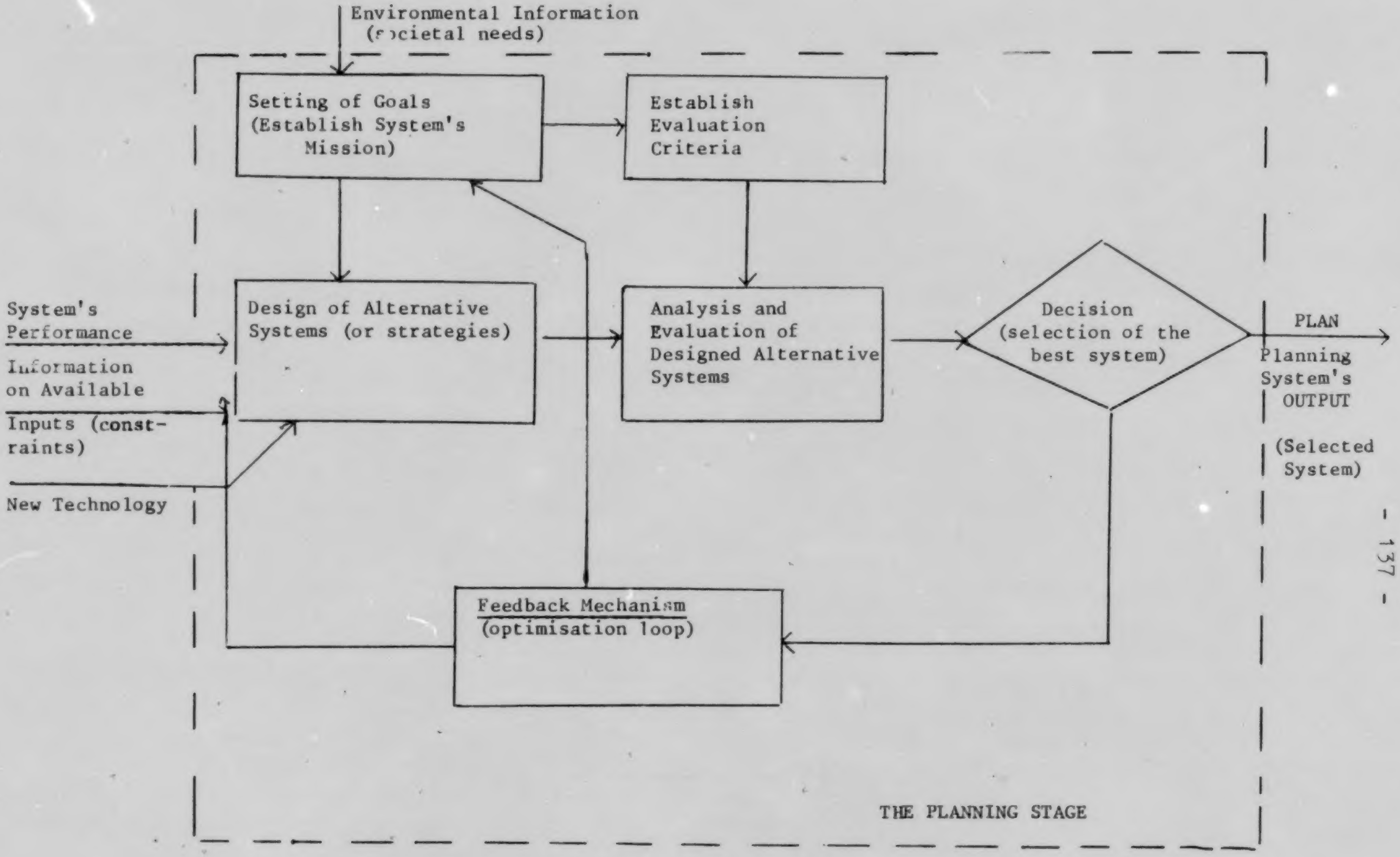
The figure also shows the internal analytical stages of

- goal setting;
- the establishing of criteria against which the performance of the system is to be judged;
- feedback for modifying the system design;

and the ways in which these influence, and are influenced by, the successive stages of

- system design (for various alternatives)
- evaluation of alternative system performance
- selection of best system.

FIGURE 3 The Systems Analysis Approach


Environmental Information
(societal needs)
Setting of Goals
(Establish System's Mission)
Establish Evaluation Criteria
System's Performance
Information on Available Inputs (constraints)
New Technology
Design of Alternative Systems (or strategies)
Analysis and Evaluation of Designed Alternative Systems
Decision
(selection of the best system)
PLAN
Planning System's OUTPUT
(Selected System)
Feedback Mechanism
(optimisation loop)
THE PLANNING STAGE

Source: OECD "Systems Approach to Educational Planning and Management", DAS/EID/71.34 (Working Document)

These last three aspects are perhaps those most central to the planning task, but it is clear that, both in general terms, and within the context of our study, these phases can only be carried out meaningfully when they are related to both the internal aspects and to the external factors.

The general framework of Figure 3 makes explicit reference both to the need to assess the performance of the system against a set of criteria, and to the existence of a feedback optimising routine. In the procedure followed in this study the criteria for assessment were mostly fairly obvious - covering such matters as financial requirements, the pedagogical factors of class sizes, educational structure, etc., and aspects of equity and social demand with respect to proportions of pupils reaching various levels of educational attainment.

But the reference to "optimisation" needs some discussion. While it is feasible to generate explicit objective functions to use with an optimising routine on some systems, it was clearly not appropriate in our situation. Even considering only the Educational system itself, it would be difficult to specify an acceptable objective, in terms of inputs to and outputs from the system. On a technical level the situation is made exceedingly complex by the need to include the dimension of time, for the performance of the system needs to be judged over a period of many years to take account of both the transition from the current system to the new one - and the substantial changes forecast in the demographic factors.

Moreover, as we have already noted, the nature of the project required that the Educational system could not be regarded as 'closed', and that the major links with its environment should be taken into account. This introduces further complexities - with subjective assessments of many social, and economic, as well as pedogogical factors being involved.

Thus there was no possibility of setting up a specific objective function, nor of pursuing a formal optimising procedure at the feedback stage. Instead, the feedback procedure used has been that of continual checking of the outputs from the educational system against the explicit or implicit constraints set by the environment, and against the value judgements of those representing both pedagogical and economic points of view.

Nevertheless, with these amplifications, it is within this general systems framework that the study has been conducted.

2.3 The System Studied - and its Sub-Systems

In section 2.2 above, the Educational system itself was treated as a single entity, while the forms of the linkages between the Educational system and the external environment were not specified in any detail.

To illustrate how the general"system's"approach was used in the project, and to introduce the succeeding chapters of this report, it is necessary to look inside the Educational system, and to specify those individual elements which were of particular importance. These are illustrated in Figure 4.

In this figure the ways in which separate factors combine in their effect on the Educational systems are shown, where this is appropriate. Thus, for example, both the demographic projections of population growth and social demand factors are shown as affecting the potential demand for enrolments in the educational system. Similarly important in influencing enrolments (particularly with respect to the levels and types of further educational provision) are manpower needs, which themselves are dependent on economic and social development.

Also shown within Figure 4 are the contributions of T.V. education, and of private schools - both of course meeting some of the demand - though not themselves part of the National school network.

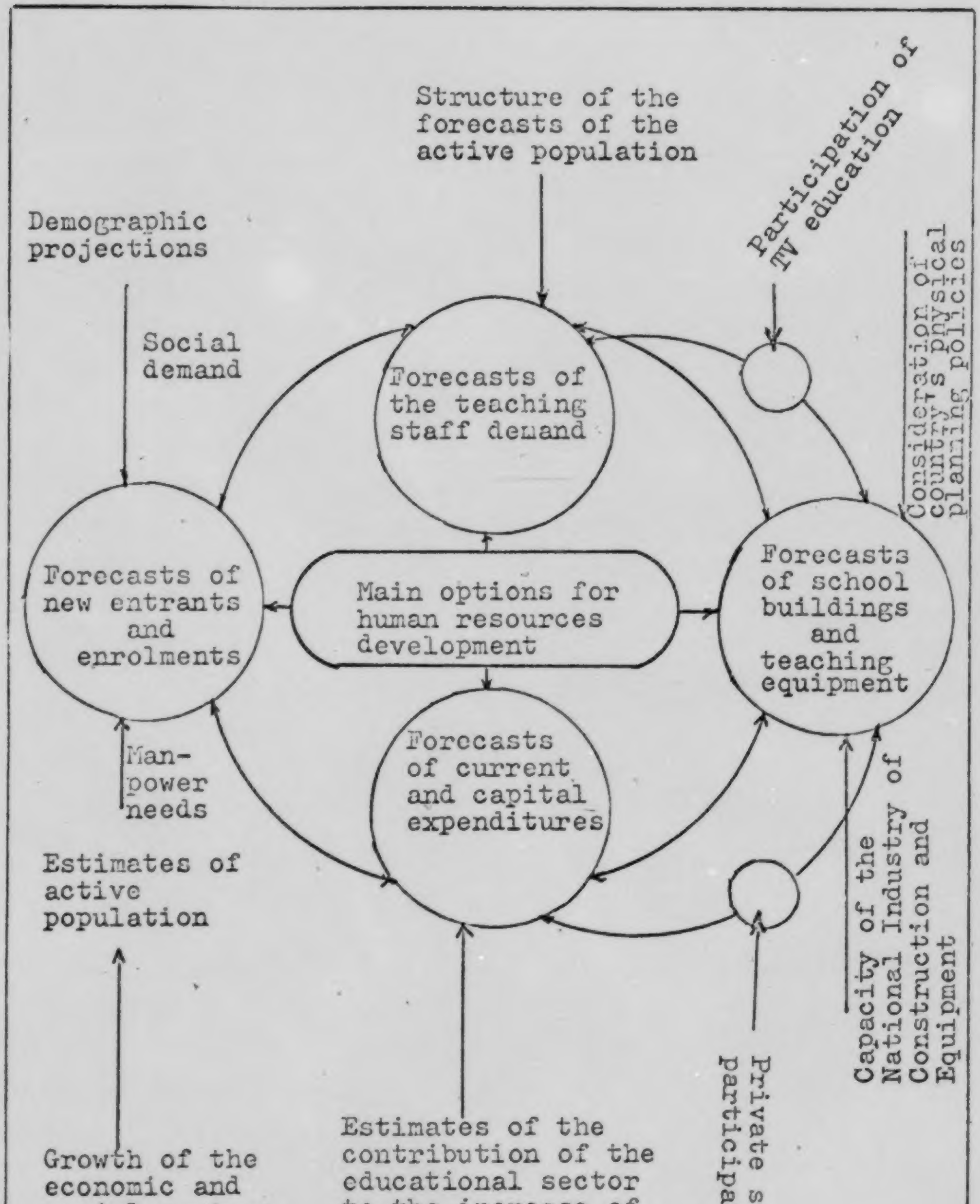
The figure indicates clearly the interactions between the major elements of

- pupil numbers
- staff availability
- equipment required
- financial resources.

These,indeed, constitute the main 'sub-systems' within the overall framework which were studied in detail and which are described in later sections of this report.

Although it is theoretically possible to carry out the successive stages of the systems study depicted in Figure 3 using the whole system, the data handling problems and the algebraic structure would have been very complex indeed. Moreover,

FIGURE 4 Overall System Interactions and the Sub-Systems Involved


Structure of the forecasts of the active population
Participation of TV education
Consideration of country's physical planning policies
Demographic projections
Social demand
Forecasts of the teaching staff demand
Forecasts of new entrants and enrolments
Main options for human resources development
Forecasts of school buildings and teaching equipment
Forecasts of current and capital expenditures
Man-power needs
Estimates of active population
Capacity of the National Industry of Construction and Equipment
Private sector participation
Growth of the economic and social sectors
Estimates of the contribution of the educational sector to the increase of GNP; levels of public financing

the linkages between the major elements in Figure 4 are in many cases aspects of the system design itself. Thus, for example, the links between pupil numbers, teaching staff requirements and the degree of TV participation depend on the class size assumed - one of the factors within the study which is both an internal "design" parameter and one which could be influenced as a result of the public debate on the total educational system.

Thus it was not only impractical, but also undesirable for methodological reasons, to attempt to model the total system as a single entity, embodying the whole range of external and internal constraints, together with the "design" parameters. Instead, and, of course, still consistent with the systems approach, the major sub-systems were modelled separately.

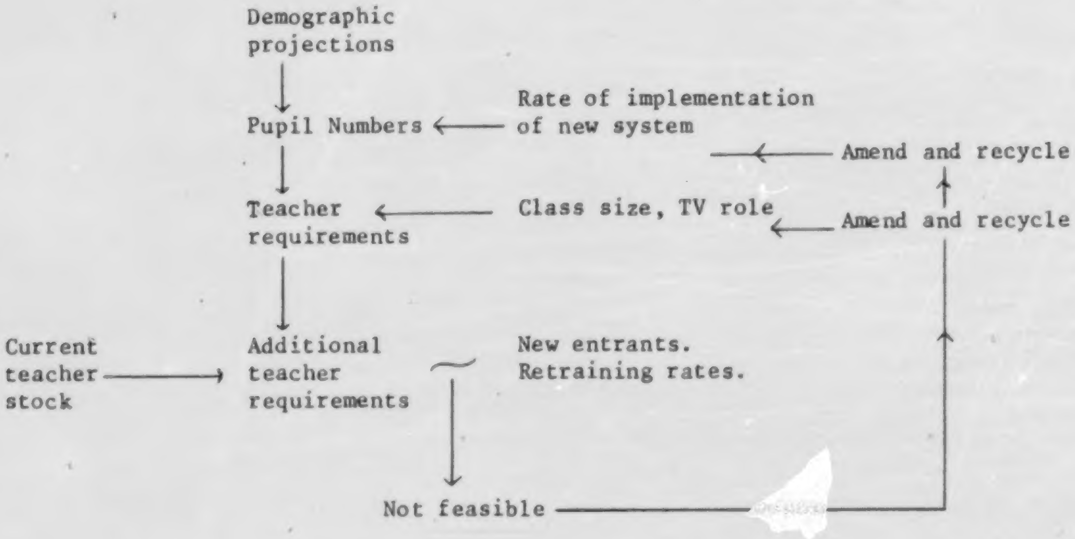
Detailed studies were carried out on each of these sub-systems as described in Chapter 3. Though they are there presented separately, it must be stressed that the final results obtained are the distillation of many iterations through the interactions in Figure 4., and by considering the variations in time.

The separate studies have sometimes involved significant problems of data collection, or of technical development. For example, much detailed study was necessary on the changes in teacher stock over recent years, while the pupil model involved the development of a simulation study of the flow of pupils through the Educational system, so that pupil numbers by level of schooling could be quickly generated under any given assumptions. The complexity of the changes involved, covering alterations to the system itself, and the transitional problems arising from these alterations, as well as progressive changes in the opportunities afforded by the new system, made this a very significant task.

Thus, an iterative approach was used - in which the various stages yielded improved understanding of the importance of the constraints, and of the form of 'acceptable' solutions. As was inevitable from the large increase in Educational opportunities afforded under the new system, the most important constraints centred on the provision of teaching resources. Thus the dominant interaction between the sub-systems tended to be between pupil numbers and teacher requirements, and over the period of the project from Autumn 1971 to Spring 1973 the loops in Figure 5 below were circumnavigated many times.

FIGURE 5

Student Numbers and Teacher Requirements


Demographic projections
Pupil Numbers
Rate of implementation of new system
Amend and recycle
Teacher requirements
Class size, TV role
Amend and recycle
Current teacher stock
Additional teacher requirements
New entrants.
Retraining rates.
Not feasible

The target levels set for the various 'design' parameters were changed frequently, to allow for subjective views on 'acceptable' levels of attainment, to ease what otherwise appeared to be infeasible resource constraints, and to allow for data changes. In this last respect, many of the changes were of course triggered from the project itself, as critical areas were identified. Thus, by a slow, sometimes painful, and often repetitive process, 'appropriate' levels for attainment and the consequent resource requirements have been identified. The preferred pattern has been used as the base for making submissions for financial requirements, and for detailing the associated programmes required to achieve the plan.

Thus the project has always endeavoured to keep the boundaries as broad as possible, and to take account of the many interactions involved, in generating an acceptable solution.

In an area in which no solution can ever be shown to be 'best', it utilizes a judicious blend of numerical analysis and subjective assessment, which is surely the most effective way to generate meaningful plans in any social context.

CHAPTER 3

BASIC MODELS OF SUBYSTEMS

3.1 Introduction

Insofar as any Educational system is based upon the number of individuals for whom education must be provided, the basis of this educational planning study consists of developing a methodology to forecast the number of students involved in the system, their composition, in terms of level of education and age, and their movement through the educational system.

In accordance with this a model was constructed to make student forecasts based on student flows, either within the educational system, from one level to another, or from outside the system, in terms of new enrolments to the various educational levels. By forecasting such flows in the future the model was used to forecast the effect on the educational system as a whole.

The model was based on three elements:-

(i) organisation charts of the educational system showing the various educational levels and the relationship between them;

(ii) the movements of students, or flows between the various levels, analysed according to

qualification, the student moves on to the next level,

repetition, the student repeats the same level again,

and drop-out, the student moves out of the educational system.

and (iii) the existing and potential students, characterised on the one hand by the present numbers of students at the various levels in the educational system, and which move through the system in time, and on the other hand, by the numbers of children in various age groups, outside the school system at the present moment, but who will enter it in the future. The first aspect is concerned with the analysis of the present educational system and the second one with the need to make demographic forecasts, especially in respect of the 0 - 6 years age group.

3.2 Student Flows

For the study of student flows, the coefficients of qualification, repetition and drop outs were calculated from historical data and were subsequently projected into the future. The main objective of the analysis is, of course, concerned with educational reform, which involves changes in the organisation structure, and it was necessary to take into account those changes when calculating the various coefficients. For instance, the creation of more polytechnic institutes (non-university graduate courses) will gradually divert many students who would previously have gone on to university education. It was, therefore, necessary to estimate rates of entry into Higher Education which obviously differ from those obtained by simple extrapolation of the past.

In the analysis of the present educational structure the identification and selection of the levels of education to be used in the model was based on the relative importance of such levels within the educational system together with the availability of statistical information concerning the various levels. Eighteen levels of education were considered, representing a large degree of detail for basic and secondary education - but for higher education only two levels, representing polytechnic and university education were used.

The possible movements between these various levels of education are shown in Figure 6 overleaf and the eighteen levels correspond to the following sectors of education:-

1. Primary Education - 1st year
2. " " - 2nd year
3. " " - 3rd year
4. " " - 4th year
5. Preparatory Cycle Secondary Education (direct and TV) and Complementary Cycle Primary Education - 1st year
6. Preparatory Cycle Secondary Education (direct and TV) and Complementary Cycle Primary Education - - 2nd year
7. Secondary Education (Lyceum) - 1st cycle, 1st year
8. " " " - 1st cycle, 2nd year } General
9. " " " - 1st cycle, 3rd year
10. " " " - 2nd cycle, 1st year } Complementary Course
11. " " " - 2nd cycle, 2nd year
12. Technical Education - Training Courses - 1st year
13. " " " " - Intermediate years
14. " " " " - Last year

15. Technical Education - Preparatory Sections - 1st year
16. " " " " - 2nd year
17. Polytechnic Education
18. University Education.

Each of the levels of education is characterised first of all by the number of students it has at a certain point in time, secondly by the relationships to other levels (student flows), and finally, by the relationships with the non-educational sector (drop-outs and new enrolments).

It is quite easy to represent the student flows mathematically by defining:-

$x(i,T)$ - the number of students enrolled in level i in year T,

$m(i,j,T)$ - the number of students who moved from level i to level j at the end of year T; $m(i,i,T)$ is the number of students who repeated year i in year T+1.

$d(i,T)$ - the number of students who left the system from level i in year T,

$a(i,T)$ - the new enrolments in level i in year T.

First of all by considering the source of students enrolled in level i in year T + 1 we have:-

$$x(i,T+1) = \sum_{\substack{j \\ j \neq i}} m(j,i,T) + m(i,i,T) + a(i,T+1)$$

representing those students moving from level j to level i, the students repeating level i and the new enrolments in level i.

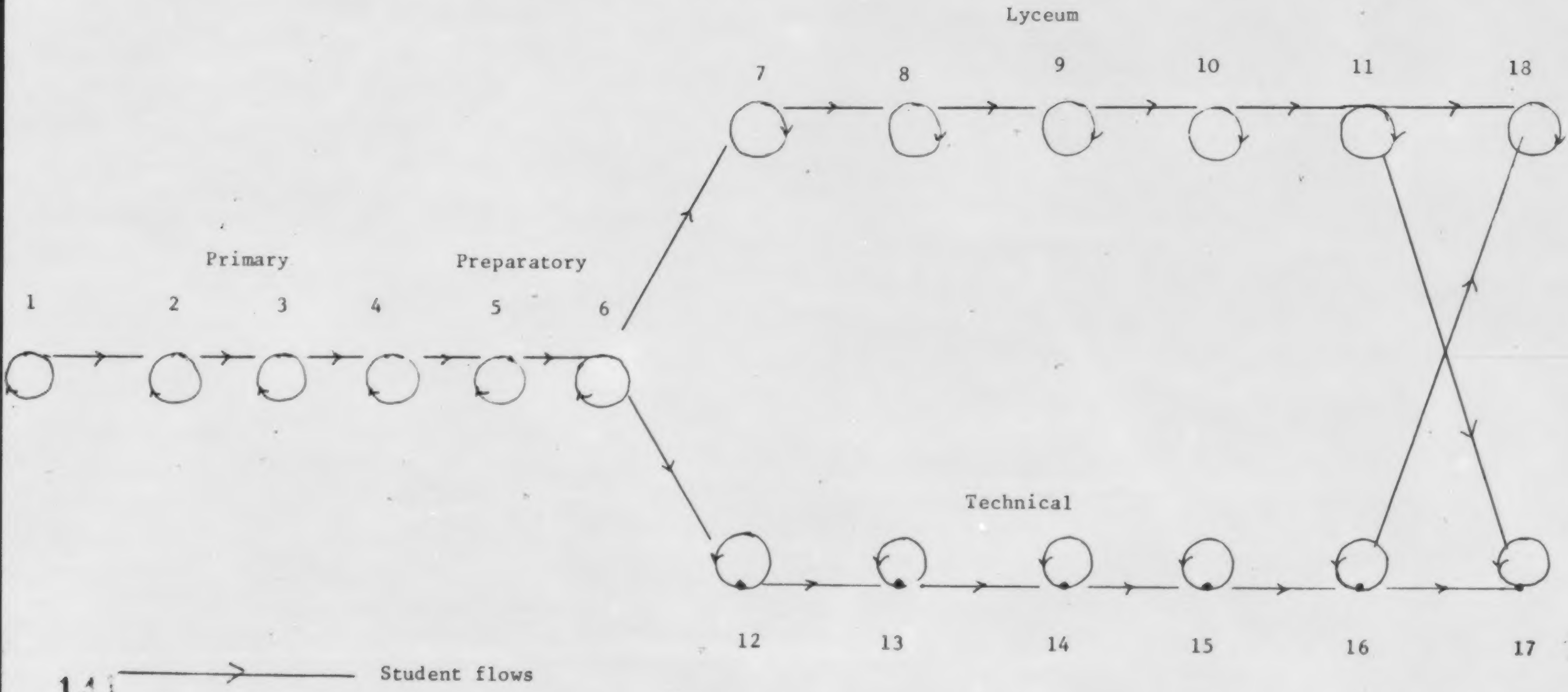
The number of students leaving level i in year T and leaving the system is given by:-

$$d(i,T) = x(i,T) - \sum_{\substack{j \\ j \neq i}} m(i,j,T) - m(i,i,T)$$

representing the number of students enrolled in level i in year T less the number of qualifying and going on to level j, and less the number repeating level i.

Because the number of students at a particular level varies over the years, thus affecting the numbers qualifying, repeating and dropping out, it is more

FIGURE 6 ORGANISATION DIAGRAM OF THE PRESENT EDUCATIONAL SYSTEM


Lyceum
7
8
9
10
11
18
Primary
Preparatory
1
2
3
4
5
6
Technical
12
13
14
15
16
17
Student flows

141
142

meaningful to model the system in terms of the proportions of students taking the various routes. From these proportions the various transition coefficients are defined by

$$p(i,j,T) = \frac{m(i,j,T)}{x(i,T)}$$

$p(i,j,T)$ gives the proportion of students in level i who moved to level j. If j is equal to i, $p(i,i,T)$ gives the repetition coefficient for level i.

Thus the number of studentsenrolling in level i, year T+1 becomes

$$x(i,T+1) = \sum_{j} p(j,i,T)\; x(j,T) + a(i,T+1) \qquad \text{\_\_\_\_\_\_ (A)}$$

and the students leaving from level i in year T becomes

$$d(i,T) = x(i,T) \left[1 - \sum_{j} p(i,j,T) \right] \qquad \text{\_\_\_\_\_\_ (B)}$$

Thus given extrapolations of the coefficients $p(i,j,T)$ together with the new enrolments $a(i,T)$, it is possible to calculate the $x(i,T)$, and thus the $d(i,T)$, into the future using the relationships (A) and (B). This procedure forms the basis of the Student Flow model.

Equation (A) may be simplified to some extent by using an obvious vector notation.

$$\underset{\sim}{X}(T+1) = \underset{\sim}{X}(T) .\; M(T) + \underset{\sim}{A}(T+1)$$

where $\underset{\sim}{X}(T)$ and $L(T)$ are row vectors of number of students and new enrolments $M(T)$ is the matrix of transition coefficients between education levels.

Figure 6, the organisational chart of the present educational system illustrates the possible flows between the various levels of education, and these flows may also be represented in a table showing the entries and exits from the various levels of education. From this table the values of the transition coefficients may be calculated directly. Table 1 shows the student flows from 1969/70 to 1970/71. The interpretation of the table is straightforward. The rows indicate the numbers of students in each level of education for the

TABLE 1

MATRIX OF STUDENT FLOWS - 1969/70 - 1970/71

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Students leaving system	TOTAL 69/70
1 Primary Ed. 1st yr.	100 675	176 938																	8 394	286 007
2 " " 2nd yr.		57 198	172 026																9 157	238 381
3 " " 3rd yr.			41 841	154 161															12 996	208 998
4 " " 4th yr				48 848	100 205														53 014	202 067
5 **Prep.Sec/prim. 1st**					17 354	86 216													8 514	112 084
6 " " " 2nd						12 087	30 331					20 512							17 773	80 703
7 Sec.(Lyceum) cycle I 1st yr.							4 996	22 556											2 337	29 889
8 " " cycle 1 2nd yr.								2 502	17 854										3	20 359
9 " " cycle 1 3rd yr.									10 920	12 331									15 869	39 120
10 " " cycle 2 1st yr.										292	10 133								-	10 425
11 " " cycle 2 2nd yr.											1 161						1 748	7 772	9 899	20 580
12 Tech. Ed.1st yr												7 328	20 843						2 700	30 871
13 " " Interm.yr.													6 983	13 151					4 483	24 617
14 " " Last yr.														2 242	7 627				3 307	13 176
15 Tech.Ed.(prep)1st															806	-			6 119	6 925
16 " " " 2nd																	-	-	-	-
17 Non-univ.grad.																	3 424	30	1 583	5 007
18 University ed.																		35 419	4 319	39 738
New Entrants	178 607								11 860		12 323					-				
Total - 1970/71	279 282	234 136	213 876	203 009	117 559	93 303	35 327	25 058	40 634	12 622	23 618	27 840	27 826	15 393	8 433	-	5 172	43 191		

year 1969/70 together with their subsequent distribution in 1970/71. The columns show the number of students in 1970/71 and their previous distribution in 1969/70.

For example, reading along the first row, in 1969/70 there were 286,007 students in Grade 1 of Primary Education and of which, in 1970/71, 100,675 repeated Grade 1, 176,938 moved on to Grade 2 and 8,394 left the educational system. In 1970/71, reading down the first column, there were 279,282 students in Grade 1 of Primary Education of which 100,675 were repeating Grade 1 and 178,607 were new enrolments.

This means that a proportion $\frac{100,675}{286,007} = 0.352$ of the students in Grade 1 in 1969/70 repeated the year in 1970/71 and a proportion $\frac{176,938}{286,007} = 0.619$ moved on to Grade 2, the remainder, a proportion of 1 - 0.352 - 0.029 left the educational system. The repetition and qualification coefficients for 1969/70 are thus 0.352 and 0.619 respectively. In this way the various transition coefficients may be calculated for the various years. Table 2 shows these coefficients for 1969/70 to 1970/71.

During the course of this study various attempts were made to develop this basic student flows model in order to estimate additional information concerning the proposed educational system. By subtle use of recursive relationships it was possible to use the past data on student flows (only this was available) to calculate the repetition rates by both age of students and by educational level. This refinement was incorporated into the model to enable the model to give, not only the numbers of students at each level, but also their age distribution.

An attempt was also made to develop the higher education section of the model, by considering the flows of students, year by year, through the higher education system. The models used were very similar to those for primary and secondary education, i.e. the number of students at a particular level being a function of the new enrolments, students repeating and students moving up from the lower levels. However, the construction and testing of these models for higher education were frustrated by the lack of reliable statistical data, particularly with respect to details by discipline and also that only biennial data on total numbers and outputs were available for some faculties.

The basic model for student flows for the present educational system was

TABLE 2

Matrix of Transition Coefficients 1969/70 - 1970/71

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Students leaving system	Total 69/70
1 Primary Ed. 1st yr.	0,352	0,619																	0,029	
2 " " 2nd yr.		0,24	0,722																0,038	
3 " " 3rd yr.			0,20	0,738															0,052	
4 " " 4th yr.				0,242	0,496														0,262	
5 Prep.Sec/prim. 1st					0,135	0,769													0,096	
6 " " " 2nd						0.15	0,376					0,254							0,220	
7 Sec.(Lyceum) cycle 1 1st yr.							0,167	0,755											0,078	
8 " " cycle 1 2nd yr.								0,123	0,877										-	
9 " " cycle 1 1st yr.									0,279	0,375									0,346	
10 " " cycle 2 2nd yr.										0,028	0,972								-	
11 cycle 2 3rd yr.											0.299						0,085	0,378	0,238	
12 Tech.Ed. 1st yr.												0,237	0,675						0,088	
13 " " Interim yr.													0,284	0,543					0,182	
14 " " Last yr.														0,170	0,579				0,251	
15 Tech.Ed.(prep.) 1st															0,116				0,884	
16 " " " 2nd																				
17 Non.univ. grad.																	0,684		0,316	
18 University ed.																		0,89	0,109	
New entrants																				
Total 1970/71																				

extended to cover the effects of the changeover to the proposed system by first of all considering organisational charts representing the structure of the educational system during and after the changeover to the proposed system. Transition matrices were postulated for each of the various years of the changeover period. The general form of these organisation charts and the corresponding general transition matrices are shown overleaf in Figures 7 and 8 overleaf. The general transition matrix in Figure 8 shows that there are four types of student flows which occur before, during, and after the changeover period, namely:-

a - the existing flows which will continue to exist in the proposed system. These flows occur mainly in the Primary Education sector.

$\bar{a}$ - existing flows which will cease to exist when the proposed system is fully implemented. These are flows within the present Secondary Education sector.

F - flows which do not exist at present, but all come into existence as the proposed system is introduced. These are the flows within the two year extension of elementary education and the proposed Secondary Education sector.

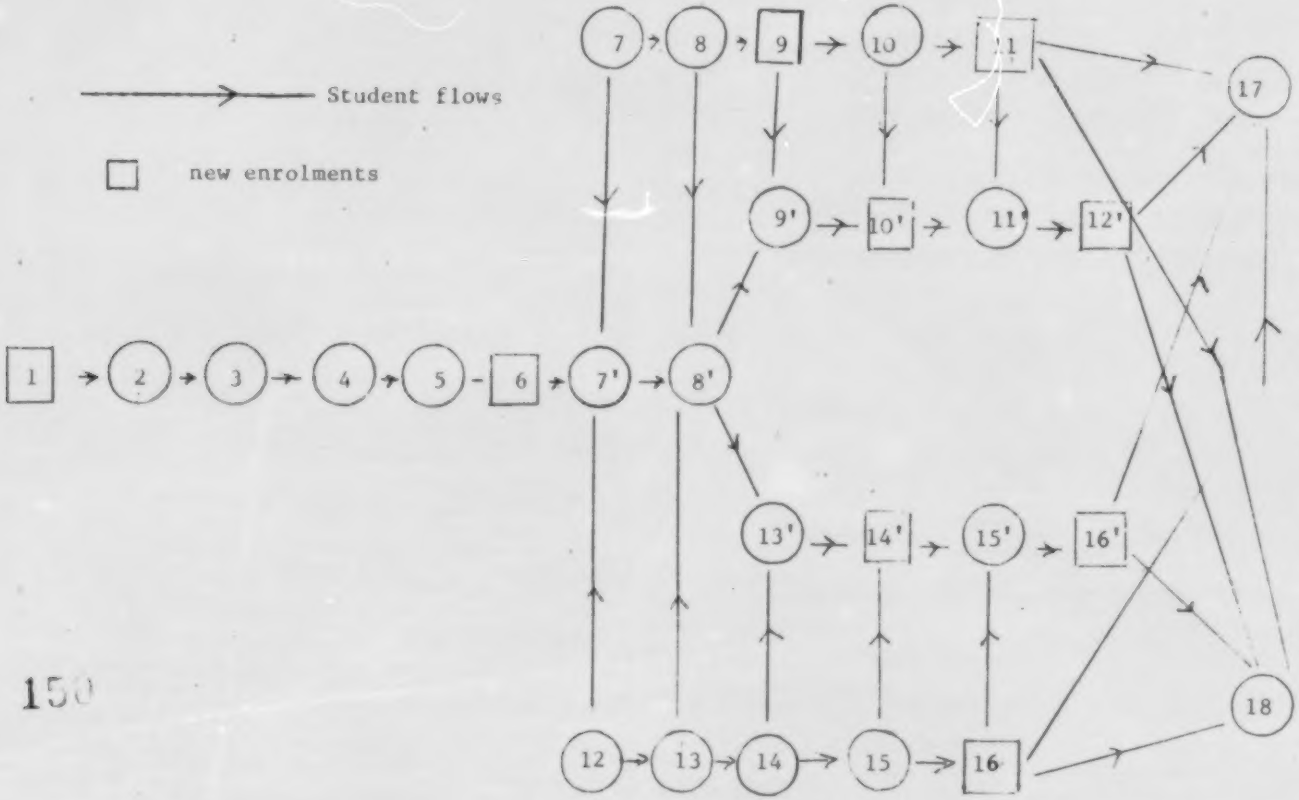
* - these are flows which are used to achieve the transition from the present system to the proposed system.

These transition matrices were calculated for each year under study and by changing the values of the '*' flows it was possible to simulate the introduction of the proposed system under several alternative policies concerning the timing and the rate of introduction of the various levels, in order to estimate the numbers of students and thus the teacher and resource requirements. This, of course, was the main purpose of the student flows model as discussed in the Introduction.

With regard to the transition coefficients 'a' and 'F' the selection of the transition coefficients may either be normative, or based upon coefficients of existing flows. The procedure used in the study was a mixture of these two methods. In general the flows 'a' were based entirely on past values but the flo

FIGURE 7

Basic structure of the educational system during the changeover from the present to the proposed system.


Student flows
new enrolments
1
2
3
4
5
6
7'
8'
7
8
9
10
11
9'
10'
11'
12'
13'
14'
15'
16'
12
13
14
15
16
17
18

Levels 1-6, 17-18 are common to both the present and proposed systems.

Levels 7-16 represent the various levels of the present system and levels 7'-16' represent the proposed system according to:-

7' - 8' { 7th & 8th years of Elementary education.

9' - 10'- 11'- 12'- { Classical Lyceums

13'- 14'- 15'- 16'- { Technical Lyceums

FIGURE 8 The general form of the transition matrices

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'
	Primary Education	1	a	a																										
		2		a	a																									
		3			a	a																								
		4				a	a																							
	Preparatory Education	5					a	a																						
		6						a	$\bar{a}$					$\bar{a}$					F											
Present Structure	Secondary Education (Lyceum)	7							$\bar{a}$	$\bar{a}$									*											
		8								$\bar{a}$	$\bar{a}$									*										
		9									$\bar{a}$	$\bar{a}$									*									
		10										$\bar{a}$	$\bar{a}$									*								
		11											$\bar{a}$										*						$\bar{a}$	$\bar{a}$
	Secondary Education (Technical)	12												$\bar{a}$	$\bar{a}$				*											
		13													$\bar{a}$	$\bar{a}$				*										
		14														$\bar{a}$	$\bar{a}$								*					
		15															$\bar{a}$	$\bar{a}$								*				
		16																$\bar{a}$									*		$\bar{a}$	$\bar{a}$
Future Structure	Additional Elementary education	7'																	F	F										
		8'																		F	F				F					
	Secondary Education (Lyceum)	9'																			F	F								
		10'																				F	F							
		11'																					F	F						
		12'																						F					F	F
	Secondary Education (Technical)	13'																							F	F				
		14'																								F	F			
		15'																									F	F		
		16'																										F	F	F
	Higher Education	17																											a	
		18																												a

(For explanation of the various symbols see page 151)

'F' were suitably modified versions of the flows '$\bar{a}$', which take into account, to some extent, the effects of the changes in the educational system. In the following chapter, which relates to the results of the study, a description of the various policies evaluated is given.

As an alternative method of evaluating the effects of different policies regarding student flows, a model, known as School System Dynamics was developed. This method is described in Appendix E. This model enables the long term effects of various policies to be evaluated directly without the need for lengthy runs of the Student Flows model.Although not used directly in the course of this study, it is felt that this model may make a valuable contribution in this function to a more detailed study of Higher Education.

3.3 Forecasts of New Enrolments

The student flows model requires forecasts, not only of the transition coefficients, but also of the new enrolments at particular levels of education. By far the most important is the number of enrolments in the first year of primary education, and in particular, how the reform relating to the lowering of the entrance age for this level is implemented. In each year the number of potential entrants to this first level of education was calculated on the basis of demographic forecasts of the population below school age.

The demographic forecasts used were supplied by the Technical Secretariat of the Presidency of the Council which gave population forecasts for 1979 and linear interpolation was carried out to determine estimates of the population between 1970 and 1979. By using estimates of the live birth rate for each year and by assuming fixed rates of infant mortality and emigration, the number of children of various ages were calculated for each year up to 1979. The model was tested on data from 1965 to 1970 and satisfactory results were obtained. These forecasts provided estimates of the potential new enrolments in the first year of Primary Education. For some aspects of the study (e.g. the provision of school buildings) it was necessary to calculate the regional distribution of the school population and this was done by analysing data from the decade 1960 to 1970 on internal migrations to provide extrapolations of those migrations up to 1979.

The new enrolments for the other levels of education (e.g. in the 2nd year of the Preparatory Education) were not so important as those from the first level of Primary Education and simple regression models, relating new enrolments to time, were used to provide the forecasts. Various models were used viz:-

$$x = a + bt$$

$$x = ae^{bt}$$

$$x = at^{t}$$

$$x = a + \frac{b}{t}$$

$$x = \frac{1}{a + bt}$$

$$x = \frac{1}{a + t^{b}}$$

with x giving the new enrolments, t representing time, and a, b being constants to be determined

The models were fitted in turn to the data for the new enrolments at the various levels by minimising the sum of squared errors and the most appropriate model chosen in each case.

3.4 Teaching Staff Models

These models were used to estimate both the supply and the demand for teachers during the period of the plan. The demand was estimated using the results from the student flows model together with several other parameters such as the class size, the extent to which television will be used and the demands for special teaching for handicapped children. For the supply of teachers estimates of the likely flow of teachers from the existing and new teacher training schools and universities were made and these were adjusted to take account of the numbers of teachers leaving the system.

3.4.1 The Demand for Teachers

For the student flows in both the present and proposed educational systems eighteen levels of education were considered, but for teacher requirements several of the levels were amalgamated to produce six sectors of education, namely:-

1. Primary Education
2. Preparatory Education
3. Secondary Education (Lyceum)

4. Secondary Technical Education
5. Non-University Graduate Education
6. University Education

These amalgamations were carried out to take into account that, a Primary School Teacher, for instance, may teach at any one of the four levels of Primary Education.

It should be noted at this stage that the supply and demand for teachers was made at an overall level and no account was taken of the regional variations or of private education.

The main parameter used in the teacher demand model is R_i, the student/teacher ratio for education branch i (for i = 1 to 6). Then if $x_i(t)$ is the corresponding number of students in branch i for year t then the number of teachers in year t is given by $\frac{x_i(t)}{R_i}$. This basic model was used, without any modification for sectors 3, 4, 5 and 6 (i.e. Secondary and Higher Education), but for Primary and Preparatory Education modifications were introduced to take account of special education (for handicapped children) and for education through the television network.

For Primary Education, if α is the proportion of children requiring special education and if R' is the corresponding student/teacher ratio then the numbers of teachers required are

$$\frac{\alpha X_1(t)}{R'} \quad \text{for special education}$$

and

$$\frac{(1-\alpha) X_1(t)}{R_1} \quad \text{for normal education.}$$

For Preparatory Education it is necessary to modify the simple model to take account of 'Telescola', the system of television teaching used in Portugal for this branch of education. If TV(t) is the proportion of students receiving TV education in year t and if R'' is the number of students per TV monitor (people specially trained to supervise the students for the TV education programmes) then

$$\frac{TV(t)\ X_2\ (t)}{R''} \quad \text{is the number of monitors}$$

and $\dfrac{(1 - TV(t))X_2(t)}{R_2}$ is the number of teachers

Early in the study it became apparent that in order to cope with the large maximum numbers of students in the preparatory sector of education it would be necessary to increase the intensity of TV teaching from the current level to a much higher level in the year for which the student numbers are a maximum, though the level could then decrease again. This is the reason that the proportion of students taking TV education is expressed as a function of time.

During the analysis of the demand for teachers, for each branch of education, usually two values of the student/teacher ratio were used: a minimum one, representing the ideal value, and a maximum one, representing the maximum permissible (and perhaps more realistic) value.

3.4.2 The Supply of Teachers

Initially it was hoped that a model of the following form could be used to estimate the availability of teachers in each of the six sectors of education.

Available teachers = Existing teachers
+ Newly qualified teachers
- Teachers who leave the teaching profession
- Teachers who retire,

and to use separate models giving new teachers, resignations and retirements. For example, it was expected that the age distribution of present teaching profession could be used to give the number of retirements for each educational sector.

However, it was found that data on which to build these separate models either was not available or of too crude a form to enable such forecasts to be made.

For Primary Education two much simpler models were therefore used. The first model used a simple extrapolation of the number of teachers in the 1960 decade. A second, more sophisticated model was based on the existing teachers, less projections of the numbers of teachers leaving the service, plus simple estimates of the number of new teachers. Thenumbers of new teachers were also modified to take account of the opening of several new teacher training colleges and the closure of some of the existing ones. A similar model was used to forecast the number of teachers for special teaching.

Teachers for Preparatory, Secondary and Higher Education need to be qualified at either Intermediate or Final Degree level. To enable forecasts to be made of the numbers of teachers in these branches it is necessary to forecast the number of graduates at these levels and the respective percentages who join the teaching profession. But such statistics were not available and simple projections for these branches were made, based on extrapolations of the number of teachers in the 1960 decade. It is anticipated that this part of the study will be continued once the number of higher teachers training colleges and the respective student places are established.

3.4.3 The model linking supply and demand

Because of the large increase in the demand for Preparatory School teachers (due to the introduction of the 7th and 8th years of basic education) some thought was given for the need to facilitate interchanges of existing teachers between the various sectors. For instance, after the initial pressure on Primary Education caused by the lowering of the school entrance age, there will be a surplus of Primary School teachers and consideration was given for provision of retraining facilities to enable some of these teachers to teach at the 5th and 6th levels of Preparatory Education. Similarly because of the reduction of the period of secondary education from five years to four, there will be a surplus of teachers in Secondary Education. These additional teachers in Preparatory Education could then be used, say, to reduce the level of 'Telescola' teaching.

It is possible to express the total retraining and transfer problem in the form of a mathematical optimisation problem, but the nature of the objective, which must be clearly specified if such techniques are used, is far from obvious. For example, the following is a list of possible objectives, which could lead to vastly different solutions:-

- Minimise the number of costs of transfers.
- Use teaching resources as fully and as efficiently as possible.
- Keep class sizes as low as possible.
- Minimise the use of 'Telescola'.
- Make all transitions as 'smooth' as possible.

But the structure of the problem is clear, the range of available policies limited and their effect clearly defined and so a 'common-sense' method was used based on examining the excesses and shortages in all branches of education; and taking into account the time required for the retraining.

3.5 Models of Other Resources

This section deals with those items that contribute to capital and current expenditure, namely, school buildings, land, school furniture, teaching equipment, teachers' salaries, etc..

3.5.1 Capital Expenditure

3.5.1.1. New School Buildings

The largest item of capital expenditure related to the construction of new school buildings. In order to estimate the number of new schools it was necessary to take into account the effect of internal migration, i.e. the drift of population to the main urban centres. The calculation of the number of new schools was carried out separately for each branch of education and the corresponding capital expenditure was calculated using costs supplied by the Directorate General of School Administration of the Education Ministry.

Because of falls in population and birth rate the future tendency is for the number of pupils in Primary Education to fall. Thus the present numbers of class rooms would be largely sufficient except for the effect of internal migrations. The forecast rate of those internal migrations was based on the rate calculated for the 1960-70 decade. Using these forecasts together with figures for the number of pupils per classroom, the number of classrooms, and thus schools, required to take account of internal migrations was calculated. Many of the schools in the urban centres were subject to an undesirable degree of shift working (e.g. in Lisbon over 60% of Primary schools are used this way) and calculations were also carried out to estimate the number of new schools required to reduce the amount of shift working in these districts to the more acceptable level of 25%. Estimates were also made of the expenditure required for repairs and improvements to existing schools.

Preparatory Education is the branch of the Education system which must sustain the highest growth in the number of students due to the increase in basic schooling from 6 to 8 years, and thus consideration was given to the construction of light pre-fabricated buildings to provide the additional accommodation, for both direct and TV teaching. The numbers of classrooms were calculated from the percentage of students receiving 'Telescola' teaching and the class size for both direct and TV education. Because of the large increase in the number of schools there was no need to take account of internal migration at this stage, but consideration will have to be given to this factor when the sites for these new schools are selected. No attempt was made for this sector to calculate the cost of reducing the level of shift working although some order of magnitude calculations were made relating to the cost of temporary buildings, improvements and repairs for existing buildings.

The number of new schools for Secondary Education was calculated in a straightforward manner from the number of additional students plus an allowance for the effect of internal migration.

Because of the lack of sufficient reliable data regarding the capital cost of new centres of higher education (both for university and non-university education) a fixed rate per student was used to calculate the cost of new buildings for higher education.

3.5.1.2 Other Capital Costs

For each branch of education, except Higher Education, an item by item list of the equipment required per classroom was made and the costs of these items were summed to produce the total equipment costs per classroom. These were then multiplied by the number of classrooms to produce the total equipment cost. For Higher Education an estimate of the equipment cost per student was made.

By taking into account the land required for schools in different areas (due to internal migration, etc.) the total cost of land for school buildings and playing fields was calculated by the Directorate General of School Administration.

Other capital expenditures which were taken into account were the costs of student residences, sports pavilions, youth centres, childrens playgrounds, kindergartens, etc..

3.5.2 Current Expenditure

Current expenditure is expenditure which takes place each year and is made up of two parts; staff expenditure, i.e. teachers' and administrations' salaries, and equipment and sundry expenditure. Staff expenditure is by far the greatest expense.

3.5.2.1 Staff Costs

The models for forecasting staff expenditure were based on time series of staff expenditure per student in current prices, from 1958 to 1970. Separate models were built for the following branches of education:-

Primary Education
Preparatory* and Secondary Education (Lyceum)
Secondary Technical Education
and Higher Education (including Teacher Training Colleges).

[*Data for Preparatory Education was only available in 1969 and 1970 and in order to base the analyses on sufficient data points Preparatory Education was combined with Secondary Education (Lyceum).]

In general, the procedure used was to build simple regression models of staff expenditure against time, using both linear and exponential forms. As there were large increases in teachers' salaries in 1969 and 1970, these data points were excluded in deriving the basic regression equations, and step changes were superimposed on the regression models to represent the large increase in these years. In addition it was assumed that from 1970 the teachers' salaries would increase at a rate of 8% per annum - this being the forecast increase of all civil service salaries.

In this way the model of staff expenditure per student was made up of three parts:-

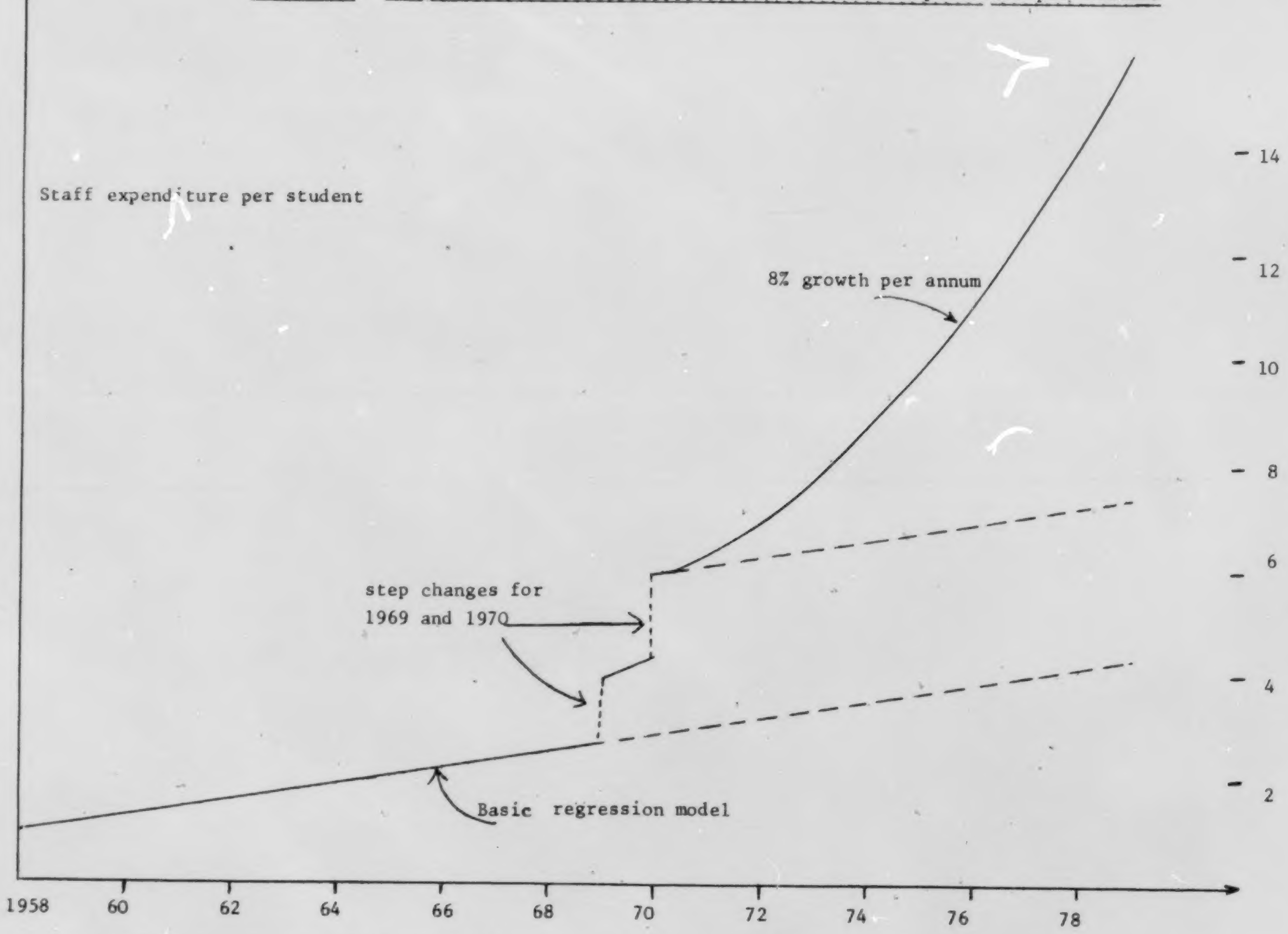
(i) A regression model based on data from 1958 to 1968 to establish the basic trend;

(ii) Step changes for 1969 and 1970;

(iii) An increase of 8% per annum up to 1979 to take account of the increase in salaries generally.

These three components are illustrated in Figure 9 over the page.

FIGURE 9 The general structure of the models for Staff Expenditure per student



For Preparatory Education (TV) the salaries of television monitors were calculated on the basis of 3500 escudos a month in 1970, increased at a rate of 8% per annum. This was divided by the student staff ratio to get the staff expenditure per student.

The basic relationship between this student staff ratio, the staff expenditure per student and the average teachers' salaries is given by

$$\text{Student staff ratio} = \frac{\text{Number of students}}{\text{Number of Staff}}$$

$$= \frac{\text{Number of students}}{\text{Staff expenditure}} \quad \text{x} \quad \frac{\text{Staff expenditure}}{\text{Number of staff}}$$

$$= \frac{\text{Average teachers' salary}}{\text{Staff expenditure/student}}$$

This relationship may be used to calculate the implied change in staff student ratio due to changes in average teachers' salaries and staff expenditure per student.

Now if S, W and E represent the student staff ratio, the average teachers' salary and the staff expenditure per student respectively in 1970 and if the prefix Δ represents the change from 1970 to 1979, (i.e. the corresponding values for 1979 are $S + \Delta S$, $W + \Delta W$ and $E + \Delta E$), then $S = \frac{W}{E}$ and $S + \Delta S = \frac{W + \Delta W}{E + \Delta E}$.

Thus the implied percentage change in student staff ratio from 1970 to 1979 may be calculated from

$$\frac{\Delta S}{S} = \frac{S + \Delta S}{S} - 1$$

$$= \frac{\frac{W + \Delta W}{E + \Delta E}}{\frac{W}{E}} - 1 = \frac{\frac{W + \Delta W}{W}}{\frac{E + \Delta E}{E}} - 1$$

Now $\frac{W + \Delta W}{W}$ is just the proportional increase in teachers salaries from 1970 to 1979 and thus $W + \Delta W = W(1.08)^9$ i.e. $\frac{W + \Delta W}{W} = (1.08)^9 \approx 2$.

and so $\frac{\Delta S}{S} = \frac{2E}{E + \Delta E} - 1$

On occasions the implied changes in staff student ratio due to increases in teachers' salaries resulted in unacceptable values of staff student ratios for 1979. In such cases the relationship between staff student ratio and staff expenditure per student was also used to evaluate the effect on staff expenditure per student of changes to the staff student ratio.

The effects of the proposed salary increases for teachers on the possible ease of recruitment or the reduction in resignations were not estimated explicitly.

3.5.2.2 Other Recurrent Costs

The majority of the remaining Current Expenditure is made up of Equipment and Sundry Expenditure representing the variable cost of running schools, e.g. chalk, paper, pencils and other teacher materials. The models used to forecast this part of expenditure were based on the same groupings of sectors of education used to forecast expenditure on teaching staff.

For each sector two alternative methods of calculation were considered in relation to this type of current expenditure:-

(a) that expenditure on equipment and sundry items should account for a certain percentage of total current expenditure;

or (b) that expenditure per student for these items would rise at 13% per annum from 1970 (i.e. treble in the nine years from 1970 to 1979).

For the first method the percentages for each sector of education were decided on the basis of past data together with some international comparisons. The figures arrived at were 10% for Primary Education, 15% for Preparatory and Secondary Education and 30% for Higher Education. In addition to this for Higher Education, 1% of National Expenditure on Research and Development was allocated for Research Expenditure.

In the second method the 1970 figures for equipment and sundry expenditure per student were used as a basis and the values trebled to give 1979 figures. In the case of Primary Education the past data indicated very low figures of around 20 escudos per student and a much higher figure of 200 escudos per student was finally used for 1979.

The results of the calculations for both methods are shown in the next chapter.

Finally, some very simple calculations were carried out to estimate the costs due to staff and other operating expenditure, for museums, annexes to some university and secondary high school buildings, admininistration, etc.. These amounted to about 6% of the total current expenditure.

CHAPTER 4

THE RESULTS OF APPLYING THE MODELS

This chapter presents some of the results obtained by using the methods described in the previous chapter. The results as a whole reflect a scenario for the development of the educational system as a whole, characterised by the principal variables. The particular scenario presented was selected from several which were explored by the team in accordance with differing demographic forecasts, various levels of enrolments as well as several values of staff student ratios and rates of change from the present educational system to the proposed system.

The main results are those resulting from the use of the student flows model which was used to determine the timetable for launching the new school system in terms of the rate of introduction of the lowering of the school entrance age and the rate of transition to the new system. Following this various alternative were evaluated concerning student/teacher ratios and classroom sizes to determine the teaching staff and other requirements together with the corresponding expenditures.

4.1 Student Numbers

4.1.1 Pre-school Education

The IV Development Plan makes provision for the creation of official schools for pre-school education which at present has developed exclusively in the private sector. At present the percentage of children in age group 4 - 5 years who receive pre-school education is very low, (at about 3%) and various strategies concerning the development of official schools were explored.

Using past data concerning the evolution of the private sector, forecasts were made for the development of this sector of pre-school education, and the INE (National Institute of Statistics) figures for the population growth were used to give forecasts of the numbers of children in the relevant age groups.

Having provided these forecasts for the private sector, calculations were carried out to determine the required extent of official participation to enable alternative levels of 15%, 20% or 30% of relevant children to be receiving pre- school education by 1979.

It was assumed that the development of the official sector would take place linearly from 1974 to 1979. The results for the three strategies are shown in Table 3.

The student flows model was used to evaluate the effects of various policies relating to the lowering of the school entrance age and the introduction to the new system, gradually replacing the old system.

4.1.2 The lowering of the Primary School compulsory entrant ag

It was always clear that the lowering of the primary school entrant age could not be generally introduced in one year, because this would mean the simultaneous intake of two annual age groups. If the measure were introduced in 1973 this would lead to an increase of over 100,000 in the number attending school for the first time (over 60% increase from one year to the next).

This large step increase would of course work right through the educational system and would only begin to disappear at about the 9th and 10th year of schooling due to the effect of school leaving and repitition.

The imbalance that such a sudden leap in the number of enrolments would impose is obvious - for example, for the first year of Primary Education an increase of 3,600 teachers would be necessary, and there are similar implications for the physical and financial resources. Furthermore the step increase would be followed by a similar decrease in the number of pupils attending school for the first time. These would then, in fact, continue to decline due to the fall in the birth rate since 1965. Thus the additional primary school teacher requirement would only be temporary, and it would be necessary to retrain some 2,600 teachers in 1974 and 900 in 1975.

A single stage introduction is therefore infeasible. Various alternative schemes were evaluated using the model and it was decided that a three-phase scheme, which would distribute the increase evenly over three consecutive years, was the most appropriate.

For example, the introduction of the first phase in 1973/74 would mean an increase of about 15,000 in the first year of Primary Education. A scheme was evaluated whereby the total number of students in the first year of Primary Education would be at more or less a constant level (of about 290,000) during the three years of introduction of the measure.

TABLE 3

Total number of children receiving pre-school education (official and private) and respective rates of intake

Year	Number in Private Schools		15% Strategy A TOTAL		20% Strategy B TOTAL		30% Strategy C TOTAL	
1971	17 700	*2.9%	17 700	*2.9%	17 700	*2.9%	17 700	*2.9%
1972	18 700	*3.1%	18 700	*3.1%	18 700	*3.1%	18 700	*3.1%
1973	19 800	*3.3%	19 800	*3.3%	19 800	*3.3%	19 800	*3.3%
1974	20 800	6.5%	23 400	7.3%	25 700	8.0%	30 000	9.4%
1975	21 900	7.1%	27 000	8.7%	31 700	10.2%	40 900	13.9%
1976	22 900	7.6%	30 600	10.1%	37 500	12.4%	51 400	17.0%
1977	24 000	8.2%	34 300	11.7%	43 500	14.8%	62 000	21.1%
1978	25 000	8.8%	37 800	13.3%	49 400	17.4%	72 500	25.5%
1979	26 100	9.4%	41 500	15%	55 400	20%	83 100	30%

* Schooling rates refer to the age group from 3 to 5 years.

The detailed model and calculations used to derive this scheme are given in Appendix A. The important results are shown in the table below which gives the new entrants and the corresponding number of students in the first year of Primary Education, from 1972 to 1977, based on assumptions of a repetition rate of 0.333, the demographic forecast supplied by Technical Secretariat and a constraint that in 1973, 1974 and 1975 the number of pupils in the first year of education should be equal.

TABLE 4 - New entrants and total students in first year of Primary Education

	New entrants to Primary Education	Total students in the first year of Primary Education
1972	168400	272000
1973	196700	287400
1974	191700	287400
1975	191700	287400
1976	141200	236900
1977	135500	214400

This table shows that a reasonably smooth absorption of the additional pupils may be achieved using this scheme. It can be shown (see Appendix A) that 49% of 6 year olds are at school in 1973, and 71% in 1974. The legislation for this process could be quite simply carried out by setting the school entrance age at 6 years 6 months in 1973, 6 years 3½ months in 1974, and 6 years in 1975. It should be noted that at present 25% of pupils in this first year are of 6 years of age already. Notice further that the numbers decline from 1976 onwards. This is an inevitable consequence from the demographic forecasts.

The student flows model was used to calculate the effect of using the above policy on total primary student numbers, using repetition and drop-out rates estimated from past data. The results are shown below:

TABLE 5 Total number of students in Primary Education

1969	935500	1977	856600
1970	930300	1978	801000
1971	931600	1979	739500
1972	914900	1980	687100
1973	923400	1981	645400
1974	929100	1982	610600
1975	939100	1983	579100
1976	902900	1984	549200
		1985	517900

These results were used as a basis for evaluating the effect of the introduction of the additional two years of schooling of the Preparatory Education level and changes to the present Secondary Education.

4.1.3 Introduction of the 3rd and 4th years of Preparatory Education

It was proposed that the introduction of the two additional years of basic schooling, [i.e. the transfer of the first and second years of Secondary Education (Lyceum) and Technical Secondary Education to the new 3rd and 4th years of Preparatory Education] would take place over a three year period. The reasons for this are to enable a smooth transfer to be made from one system to the other. Thus the two systems would exist together for a number of years, ensuring fair treatment for those students who have to repeat any school year, and avoiding the compulsory transfer to a very different teaching regime.

The proposed timetable for the phasing in of the new system to replace the old system is shown in Figure 10 over the page.

The introduction of the proposed system, for each year of schooling, takes place over three years. For example, the 7th year of schooling under the present and the proposed systems will run in parallel for 1972/73, 1973/74 and 1974/75 ($A' - A$ in the diagram), and has the form of an experimental system for the first year, (to iron out problems with curricula, etc.), a Generalised Experimental System in the second year and the full Compulsory System in the third year. The old system continues to run in parallel for these three years to take account of students repeating the year. [However, anyone repeating more than twice will have to be absorbed into the new system - although it was considered that the number of such cases would be negligible.] Note that the additional year in the proposed system is the final year of secondary education (12th year of schooling) and has no equivalent in the present system.

The timetable for the changeovers shown in Figure 10 was used as a basic framework for the changeover from the present to the proposed system but the actual rates of transfer were calculated by considering various alternatives which were evaluated using the student flows model.

In 1969/70 28% of the pupils who had concluded the 4th year of Primary Education in the previous school year dropped out of the school system, 49% went forward to the first year of preparatory education and 23% repeated the 4th year of Primary Education. This high drop out rate was because the extension to 6-year compulsory

FIGURE 10

Timetable for changing from the Present to the Proposed Preparatory and Secondary Education System

Education Level	Year of Schooling	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Present Secondary Education (Lyceum and Technical)	7	→	→	→ A					
	8	→	→	→	→				
	9	→	→	→	→	→			
	10	→	→	→	→	→	→		
	11	→	→	→	→	→	→	→	
Extension to Preparatory Education	7	A′ ←	←	←	←	←	←	←	←
	8		←	←	←	←	←	←	←
Proposed Secondary Education (Lyceum and Technical)	9			←	←	←	←	←	←
	10				←	←	←	←	←
	11					←	←	←	←
	12						←	←	←

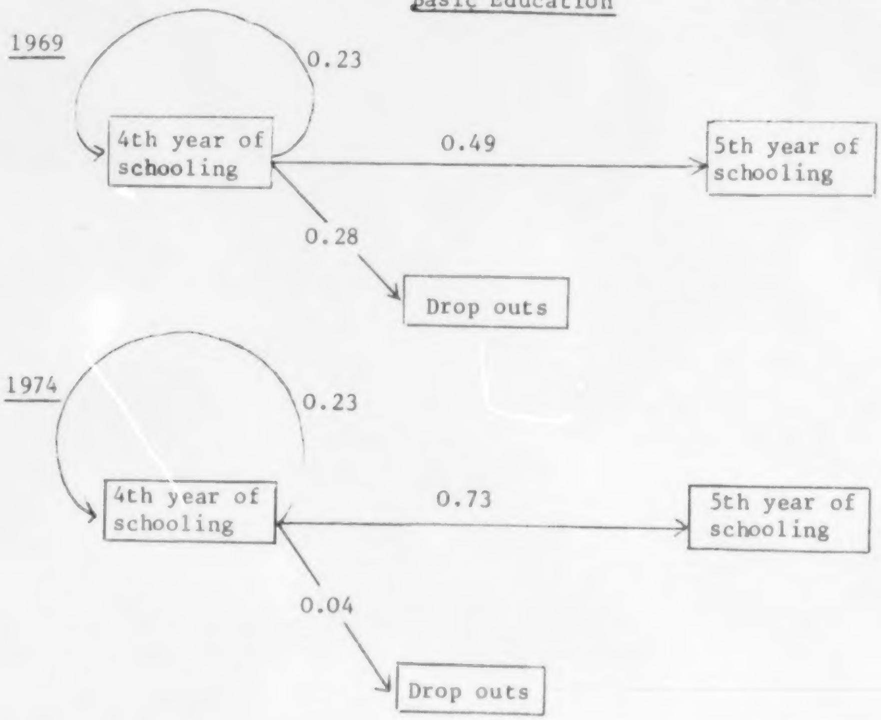
education (from 4 years) was still not fully implemented by 1969/70. It was thought that, following the introduction of the additional two years compulsory Preparatory Education and the lowering of the school age, the drop-out rate would fall to about 4% in 1974. Assuming that the repetition rate stays the same, the transition ratio to Preparatory Education (5th year of Education) will progressively increase and the values below have been assumed:

TABLE 6 - Drop-out and transition rates for 4th year of Education

	Drop-out rate	Transition to Preparatory Education
1969	0.280	0.490
1970	0.232	0.538
1971	0.184	0.586
1972	0.136	0.634
1973	0.088	0.682
1974	0.040	0.730

The repetition rate will remain constant at 0.23. The diagram below shows the situation in 1969 compared with the envisaged situation in 1974.

FIGURE 11 - Drop-outs and transition rates before and after the extension of Basic Education


1969
0.23
4th year of schooling
0.49
5th year of schooling
0.28
Drop outs
1974
0.23
4th year of schooling
0.73
5th year of schooling
0.04
Drop outs

A reduction in the drop-outs at this stage implies a matching increase in the number of drop-outs in the last school year, and in absolute terms, an increase in the number of students who do not continue on to Higher Studies after the 8 years of basic schooling. This is due to the fact that a large number of individuals who would have abandoned their studies on their own initiative will now be obliged to continue their studies beyond the 6th year. So as the compulsory schooling extends to 8 years, the rate of drop-out after 8 years will increase and this will be discussed further when considering the transition coefficients into secondary education. This demonstrates the high correlation between some of the transition coefficients, which was not taken into account formally in the model. Clearly great care must be taken when any of the transition coefficients are changed so that the effect on other coefficients is taken into account.

An important part of this study was to determine the effect of various policies concerning the timing and the rate of introduction of the new 3rd and 4th years of Preparatory Education. By assuming various rates for drop-outs and repetition at the end of the 2nd year of Preparatory Education (6th year of basic schooling), two alternative sets of figures were considered relating to the introduction of the new preparatory years and the gradual phasing out of the change to Secondary Education at this stage. These are shown in Table 7.

TABLE 7

The transition coefficients for the 2nd to the new 3rd year of Preparatory Education

Year	Alternative A	Alternative B
1973	0.446	0.446
1974	0.502	0.450
1975	0.558	0.455
1976	0.614	0.459
1977	0.670	0.513
1978	0.726	0.647
1979	0.782	0.782

Alternative A represents a straight line increase in the coefficient from 0.446 in 1973 to 0.782 in 1979. Alternative B, however, gives a much more gradual increase in the first 4 years followed by larger increases in the later years.

Alternative A was used initially but this seemed to put too much pressure on Preparatory Education in regard to the total number of teachers required in the earlier years, and Alternate B was thus introduced, which had the effect of delaying the large increases in student numbers until the Primary Education level had fully absorbed the 6 year olds and the numbers of students in Primary Education had begun to fall. Thus the total number of students in Preparatory education is more stable, though the proportions between each sector changes substantially over time.

The student numbers in the different years of Preparatory Education resulting from the Alternative B is shown in the Table 8. It can be seen that the total number of students increases in every year up to 1980 and thereafter falls as the initial effect of the additional years and the higher Primary School population passes through the school system and the demographic effect begins to become apparent.

4.1.4 The Effect on Secondary Education

With regard to Secondary Education it was thought that after taking into account the increased drop-out rate at the end of the new 4th year of Preparatory Education (due to the extension of basic schooling from 6 to 8 years) the numbers of students going on to Secondary Education under the new system would be at more or less the same level as in the old system. That is to say it was assumed that the transition coefficients from the 8th year of basic education to the first year of Secondary education (Lyceum) and to the first year of secondary technical education would be broadly equivalent (after adjustments in the drop-out rate to allow for the reduced drop-out rate at the end of Primary Education) to the transition coefficients from the second year of Preparatory education to secondary education under the old educational system. In fact some small allowances were also made to account for the effect that a longer period of basic education may encourage more students to take higher studies.

Superimposed on this problem of forecasting the total number of students in Secondary Education was the problem of the changeover from the present Secondary Educational system to the proposed system.

TABLE 8

The numbers of students in Preparatory Education (Alternative B)

YEAR	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	TOTAL
1969	112 110	80 700	0	0	192 800
1970	135 632	106 320	0	0	242 000
1971	151 644	129 017	0	0	280 700
1972	169 929	145 472	0	0	315 400
1973	187 587	162 630	64 880	0	415 100
1974	200 393	179 339	87 456	48 660	515 800
1975	199 328	192 379	100 918	80 189	572 800
1976	194 292	194 117	110 695	100 531	599 600
1977	197 447	190 902	124 128	113 180	625 700
1978	202 495	192 921	150 439	127 049	672 900
1979	206 104	197 521	183 960	150 943	738 500
1980	194 401	201 392	194 932	183 252	774 000
1981	177 244	193 494	200 373	201 174	772 300
1982	162 144	179 333	195 394	210 631	747 500
1983	150 614	165 708	183 224	209 734	709 300
1984	141 677	154 893	169 892	200 338	666 800
1985	134 195	146 454	158 502	187 520	626 700

The transition coefficients from present Preparatory Education to Secondary Education were estimated taking into account the above aspects and are shown in the table below.

TABLE 9 Transfer rates to Secondary Education

Year	Transfer coefficients from present Preparatory Education to Secondary Education	
	Lyceum	Technical
1973	0.229	0.217
1974	0.216	0.206
1975	0.207	0.196
1976	0.199	0.189

The above figures were calculated on this basis of Alternative A for the transition from the 2nd to the new 3rd year of Preparatory Education.

Using these figures and by calculating drop-out and repetition rates from on past data, the student flows model was used to calculate the student flows for each year of Education up to 1985. The results are shown in the following tables, which show quite clearly the changeover from one system to the other. Both Lyceum and Technical Secondary Education show more or less stable total numbers up to about 1979, except for relatively small fluctuations during the changeover period and during the period of introduction of the new years of Preparatory Education; and the quite large increases as the final year of Secondary Education comes into existence, for which there is no equivalent in the present system. (Remember that the first two years of secondary education is replaced by the new years of Preparatory Education and so these tables should be studied in conjunction with the table showing the Preparatory Education.)

4.1.5 Higher Education

Presently about 40% of those in the last year of Secondary Education (Lyceum) go forward to Higher Education, 80% of those students going to University and 20% to other Higher Education establishments.

TABLE 10

FORECAST NUMBER OF STUDENTS IN SECONDARY EDUCATION (LYCEUM) FOR THE PRESENT AND PROPOSED EDUCATIONAL SYSTEMS

Year	Present Secondary (Lyceum)						Year	Proposed Secondary Education (Lyceum)					Total Secondary Education (Lyceum)
	General Course			Supplementary Course		Total		1st Cycle		2nd Cycle		Total	
	1st year	2nd year	3rd year	1st year	2nd year			1st year	2nd year	1st year	2nd year		
1969	29 900	20 400	39 100	10 400	20 600	120 400	1969	0	0	0	0	0	120 400
1970	30 833	26 334	39 334	11 452	22 372	130 374	1970	0	0	0	0	0	130 374
1971	34 104	27 752	45 249	11 563	23 923	142 591	1971	0	0	0	0	0	142 591
1972	37 006	30 538	48 899	13 217	26 675	156 335	1972	0	0	0	0	0	156 335
1973	5 587	30 865	53 139	14 328	29 008	132 927	1973	0	0	0	0	0	132 297
1974	391	8 104	55 441	15 569	30 937	110 442	1974	0	0	0	0	0	110 442
1975	0	795	37 103	16 260	32 863	87 021	1975	16 057	0	0	0	16 057	103 078
1976	0	0	7 078	17 081	34 253	58 412	1976	28 388	18 966	0	0	47 354	105 766
1977	0	0	0	4 001	35 818	39 819	1977	37 182	35 547	6 638	0	79 367	119 186
1978	0	0	0	0	9 702	9 702	1978	41 810	48 492	12 292	12 106	115 180	124 882
1979	0	0	0	0	0	0	1979	43 131	56 801	18 386	21 823	140 141	140 141
1980	0	0	0	0	0	0	1980	39 137	60 943	20 799	30 098	150 977	150 977
1981	0	0	0	0	0	0	1981	45 927	59 493	22 369	34 966	162 755	162 755
1982	0	0	0	0	0	0	1982	50 775	65 097	21 940	37 968	175 780	175 780
1983	0	0	0	0	0	0	1983	53 483	71 366	23 879	38 733	187 461	187 461
1984	0	0	0	0	0	0	1984	53 607	76 193	26 171	40 762	196 733	196 733
1985	0	0	0	0	0	0	1985	51 508	78 438	27 975	43 520	201 441	201 447

TABLE 11

FORECAST NUMBER OF STUDENTS IN SECONDARY TECHNICAL EDUCATION IN THE PRESENT AND PROPOSED EDUATIONAL SYSTEMS

Year	Present Secondary Technical Education						Proposed Secondary Technical Education						Total Secondary Technical Education
	Basic Courses			Supplementary Courses			Year	1st Cycle		2nd Cycle		Total	
	1st year	Intermediate year	Last Year	1st year	2nd year	Total		1st year	2nd year	1st year	2nd year		
1969	30 900	24 600	13 200	4 000	3 000	75 700	1969	0	0	0	0	0	75 700
1970	32 351	32 515	16 259	4 626	4 248	89 999	1970	0	0	0	0	0	89 999
1971	35 726	36 950	21 134	5 640	5 186	104 636	1971	0	0	0	0	0	104 636
1972	38 624	41 238	24 804	7 251	6 320	118 237	1972	0	0	0	0	0	118 237
1973	9 269	45 155	28 060	8 643	9 722	100 849	1973	0	0	0	0	0	100 849
1974	1 112	27 109	30 994	9 865	13 925	83 005	1974	0	0	0	0	0	83 005
1975	0	6 952	28 545	10 960	16 246	62 703	1975	16 057	0	0	0	16 057	78 760
1976	0	0	9 981	14 750	17 750	42 596	1976	28 388	18 966	0	0	47 354	89 950
1977	0	0	0	6 614	22 990	29 604	1977	37 329	35 547	5 310	0	78 186	107 790
1978	0	0	0	0	9 961	9 961	1978	41 828	48 314	10 218	10 885	111 245	121 206
1979	0	0	0	0	0	0	1979	43 133	56 758	14 833	19 083	133 807	133 807
1980	0	0	0	0	0	0	1980	39 137	60 931	16 633	25 952	142 653	142 653
1981	0	0	0	0	0	0	1981	45 927	59 489	17 891	29 806	153 113	153 113
1982	0	0	0	0	0	0	1982	50 775	65 096	17 550	32 196	165 617	165 617
1983	0	0	0	0	0	0	1983	53 483	71 365	19 103	32 847	176 798	176 798
1984	0	0	0	0	0	0	1984	53 607	76 192	20 937	34 485	185 221	185 221
1985	0	0	0	0	0	0	1985	51 508	78 438	22 379	36 697	189 022	189 022

Part of the Development Plan was to allow for the creation of many more Higher Education establishments and in particular Polytechnic Institutes. It is envisaged that the introduction of these establishments would lead to a change in the 80/20 distribution and that once these centres are established the split between University and Non-University higher education would be 50/50. The assumption was made that these new Institutions would be fully established by 1976, and this, together with the assumption that the total demand for Higher Education would remain at the 40% level, lead to the transition ratios shown in table 12 below.

TABLE 12 - Transition coefficients from Secondary Education (Lyceum) to Higher Education

Year	Non-University	University
Until 1971	0.080	0.320
1972	0.104	0.296
1973	0.128	0.272
1974	0.152	0.248
1975	0.176	0.224
1976 and following	0.200	0.200

Insufficient data was available concerning the transitions from Secondary Technical Education to Higher Education and thus the following assumptions were made:-

- that up to 1972 the transitions would be insignificant (in absolute terms) because of the low numbers of students in the last year of Technical education;
- after 1972 the total demand for Higher Education would be 40% of those students in the final year (i.e. the same as for the Lyceum);
- that the split would be $\frac{2}{3}$ for non-university education and $\frac{1}{3}$ for university education.

These assumptions give the transition coefficients in the next table.

TABLE 13

Transition rates from Secondary Technical Education to Higher Education

Year	Non-University	University
Until 1972	0	0
1973 and following	0.27	0.13

It was thought that the reduction in the rate of overcrowding in the Universities by the creation of these new Higher Institutes of Education together with some increases in the number of universities might lead to an increase in the quality of education provided at the Universities and thus may lower the repetition rates, and so these were reduced to some extent (having the effect of lowering the average length of stay at University).

The results of these forecasts are shown in Table 14, and it can be seen that the University sector shows steady increases in the total number of students, and very large increases in the numbers in Non-University Education, due mainly to the flows from the Secondary Technical Schools.

4.1.6 Total Student Numbers

Table 15 gives the forecasts of these total numbers of students by level of education in 1969 up to 1985. These results of the student flows model were then used to determine the demand for teachers and other resources during the period of the Plan.

4.2 The supply and demand for teachers

This section gives the results of using the data from the student flows model together with various alternative policies regarding student/teacher ratios, etc. to give the corresponding teacher requirements. These figures were then compared with the results of the models forecasting the teacher supply for each branch of education and various schemes were evaluated concerning the redeployment and retraining of teachers.

TABLE 14

Forecasts of the number of students taking higher education in the period 1971 - 1980

Year	UNIVERSITY			Non-University Higher Education	TOTAL
	Baccaulaureate University Three first years	Graduates or last year	TOTAL		
1971	37 100	11 300	48 400	7 800	56 200
1972	41 100	12 200	53 200	9 000	62 200
1973	44 800	13 200	58 000	13 100	71 100
1974	48 100	14 400	62 500	19 000	81 600
1975	50 900	15 600	66 500	27 000	93 500
1976	52 800	16 800	69 600	36 000	105 600
1977	55 000	17 900	72 900	44 400	117 200
1978	57 900	18 900	76 800	53 400	130 200
1979	58 200	20 000	78 200	58 700	136 900
1980	56 900	20 800	77 700	61 100	138 800

TABLE 15

Students in the Portuguese Educational System by levels and year of education

Year	Primary Education	Preparatory Education	Secondary Education (Lyceum)	Secondary Education (Technical)	Higher Education	Total
1969	935 500	192 800	120 400	75 700	46 000	1 370 400
1970	937 100	242 000	130 374	89 999	48 670	1 448 100
1971	931 600	280 700	142 591	104 636	51 712	1 511 200
1972	914 900	315 400	156 335	118 237	56 248	1 561 100
1973	923 400	415 100	132 927	100 849	62 858	1 635 100
1974	929 100	515 800	110 442	83 005	70 951	1 709 300
1975	939 100	572 800	103 078	78 760	80 498	1 774 200
1976	902 900	599 600	105 766	89 950	90 552	1 788 800
1977	856 600	625 700	119 186	107 790	100 524	1 809 700
1978	801 000	672 900	124 882	121 206	117 628	1 837 600
1979	739 500	738 500	140 141	133 807	122 893	1 874 800
1980	687 100	774 000	150 977	142 653	124 241	1 879 000
1981	645 400	772 300	162 755	153 113	131 214	1 864 800
1982	610 600	747 500	175 780	165 617	140 768	1 840 200
1983	579 100	709 300	187 461	176 798	151 317	1 804 000
1984	549 200	666 800	196 733	185 221	161 155	1 759 100
1985	517 900	626 700	201 447	189 022	171 230	1 706 300

4.2.1 Primary education

The results of the models for forecasting the supply of Primary School teachers, described in the previous chapter are given in Table 16. A model was used which took into account the decline of the existing teacher stock plus the outputs of the various teacher training colleges.

In order to calculate the demands for teachers for Primary Education it is necessary to take account of the need for special teachers for pupils who have physical or mental disabilities. It was estimated that 11% of pupils require this kind of teaching and that for these the student/teacher ratio was taken to be 15.

For general teaching, the historic value of student/teacher ratio over the 1960 decade was 32.3 and this was taken as one value. A second value of 25 for the student/teacher ratio was also examined, representing the 'ideal' value. A further value of 30 was also considered, representing a value between the 'ideal' and the 'historic' values.

In addition to these, alternative student/teacher ratios of 32.3, 30 and 25 were used for the total Primary School population, without distinction between the two kinds of teaching, except that 4% of children, representing the most severely handicapped, would have no formal education at all.

The results of these calculations are shown in Table 16 overleaf and the forecasts resulting from treating General and Special Education separately were considered to be the most important results.

4.2.2 Preparatory Education

Insufficient data was available to forecast, with any degree of accuracy, the supply of teachers based on extrapolations from the past decade and it was assumed that the present stock of 10,000 teachers would still be available.

For the demand for teachers at this level, several alternative strategies were put forward concerning the forecast use of TV education and these were as follows:-

Strategy A - That the current percentage of 10.7% of pupils receiving TV education would be maintained.

Strategy B - That the percentage of students receiving TV education would increase linearly from the present level of

TABLE 16

SUPPLY AND DEMAND FOR TEACHERS FOR PRIMARY EDUCATION

Demand taking no account of special teacher requirements				Demand taking account of special teaching				Supply
				General			Special	
Pupil /teacher ratio	32.3	30	25	32.3	30	25	15	
1973-74	28 515	29 546	35 455	23 391	27 391	32 869	6 771	29 716
1974-75	28 691	30 967	37 160	25 535	27 561	33 073	6 813	30 384
1975-76	28 999	31 300	37 560	25 809	27 857	33 428	6 886	32 418
1976-77	27 884	30 097	36 116	24 818	26 786	32 143	6 622	32 418
1977-78	26 452	28 550	34 260	23 542	25 410	30 492	6 281	33 385
1978-79	24 737	25 632	30 784	22 017	23 763	28 516	5 873	34 315

10.7% to 30% in 1980 and then decrease linearly to 10.7% again in 1985.

Strategy C - Similar to Hypothesis B except a level of 40% is envisaged for 1980.

AlternativesB and C were brought into consideration because of the large increases in student numbers, which reach a peak in about 1980 and then start to decline (see table15).

Although several student/teacher ratios were considered, a value of 30 was considered to give most meaningful results. These are shown in Table17.

For the comparison of supply and demand of teachers, the discrepancy being most acute in this sector of education, the hypotheses concerning maintaining the present TV percentage was considered the most important. If a severe shortage of teachers still resulted after the calculation of transfers of surplus teachers from other branches of education (i.e. Primary and Secondary Education) then consideration would be given to the results of the other hypotheses concerning increases in TV percentage.

4.2.3 Secondary Education

Simple projections of the number of teachers in this level of Education are shown in Table18 for both Lyceum and technical education.

In the calculations of demands for teachers, two cases concerning student/teacher ratios were put forward - of 18 and 20 for Lyceum education and 17.3 and 20 for Technical education. The figures of 18 and 17.3 were the corresponding values for the 1960-70 decade and the results of calculations following these assumptions are shown in Table18 and it can be seen that there is a large surpluses of teachers in most years because of the reduction in the number of levels of Secondary Education, from 5 years to 4 years.

4.2.4 Higher Education

Similar simple projections for teachers in Higher Education lead to the forecasts in Table 19 for both university and non-university teachers.

TABLE 17

TOTAL DEMAND FOR TEACHERS IN PREPARATORY EDUCATION

	A) Maintaining the present T.V. %		B) T.V. Variable % (1)		C) T.V. Variables % (2)	
	Direct	TV	Direct	TV	Direct	TV
1973-74	12 356	1 480	11 382	2 455	10 861	2 978
1974-75	15 605	1 870	14 067	3 408	13 246	4 225
1975-76	17 184	2 138	15 731	4 247	14 604	5 374
1976-77	19 373	2 321	16 701	4 994	15 273	6 422
1977-78	20 661	2 476	17 403	5 733	15 663	7 473
1978-79	21 853	2 619	17 978	6 495	15 907	8 566

A) 10.7% Percentage of pupils to be educated through TV for all years

B) Arithmetical increase in TV percentage (1969-10.7%) (1980-30%) (1985-10.7%)

C) Arithmetical increase in the TV percentage (1969- 10.7%)(1980 - 40%) (1985 - 10.7%)

TABLE 18

Supply and Demand for Teachers in Secondary Education

Year	Supply			Demand					
	Lyceum	Technical	Total	Lyceum		Technical		Total	
Pupil/teacher Ratio	-	-	-	18	20	17.3	20	lower values	higher values
1973	8004	8296	16 300	7 855	6 647	5 801	5 043	13 186	11 690
1974	8199	1621	16 820	6 136	5 522	4 776	4 150	10 912	9 672
1975	8394	8945	17 339	5 727	5 154	4 532	3 138	10 259	8 292
1976	8589	9269	17 858	5 858	5 272	5 156	4 481	11 014	9 753
1977	8783	9593	18 376	6 552	5 897	6 130	5 327	12 682	11 224
1978	8978	9917	18 895	6 769	6 092	6 800	5 909	13 569	12 001

TABLE 19

Supply of teachers for Higher Education

Year	Non-University	University
1973	1539	1738
1974	1584	1806
1975	1629	1875
1976	1674	1944
1977	1719	2012
1978	1768	2081

Demand for teachers in higher education

	Non-University		University
Pupil/Teacher	10.9	25	25
1973	1 163	508	2 006
1974	1 632	713	2 125
1975	2 229	974	2 245
1976	2 897	1 267	2 356
1977	3 530	1 543	2 477
1978	4 486	1 961	2 744

For University Education a figure of 25 was used for student/staff ratio, the historical value. It was felt that although this figure may be justified in the short and medium term, a study should be carried out to determine the value of student/staff ratio for different courses within the universities so that the effects of any changes in the distribution of students between courses could be taken into account.

For Higher Education non-university education two values for the student/teacher ratio were used; 10.9, representing the historical figure over the last five years and a figure of 25, the historical ratio for University Education. The low historical figure of 10.9 was caused by two factors, namely that the present non-university is of an intensely technical nature and also that it was mostly private education. Since both of these factors are to be changed by the proposed Educational system, the figure of 25 was considered the most relevant.

The results of applying these ratios to the forecasted student numbers are shown in Table 19 and it can be seen that there are quite large discrepancies between supply and demand, particularly in the later years of university education.

4.2.5 Teacher Retraining

The projections of student and teacher numbers were subject to many variations and uncertainties. In particular the numbers of new entrants to the teaching profession, at all levels, could not be estimated with accuracy, and there was some uncertainty in the required student/teacher ratios.

But despite these factors several points were clear if no retraining or other changes were introduced.

- even the present stock of Primary teachers will be more than sufficient in the 1980's and the output of the new teacher training colleges will further accentuate this,

- the change in the Secondary Education structure yields a surplus of teachers immediately and although the demand in this sector increases substantially it is likely that supply will still exceed demand,

- the preparatory sector is certain to be short of teachers, and the deficiency will have to be met by TV Education, probably in all years; or by staff from other sectors.

From these observations it was obvious that the most effective use of teachers would arise if:

(a) the excess of primary school teachers were retrained, where possible, for preparatory school teaching,

(b) as far as possible, the programmes of the present primary teacher training colleges were altered to produce preparatory school teachers,

(c) the excess of secondary school teachers were used in the preparatory schools,

(d) the student/teacher ratios in the Primary and Secondary schools (if (b) and (c) are feasible) should be kept high to ease the burden on the Preparatory Schools,

Also, it was agreed that the use of TV in preparatory schools should be treated as 'residual', after allowing for the above factors.

Figure 12 shows the balance between supply and demand for teachers in the Primary and Secondary schools under various hypotheses and the table below shows the Preparatory requirements (with no TV increases and the maximum student/teacher ratio).

TABLE 20 Preparatory Education teacher requirements

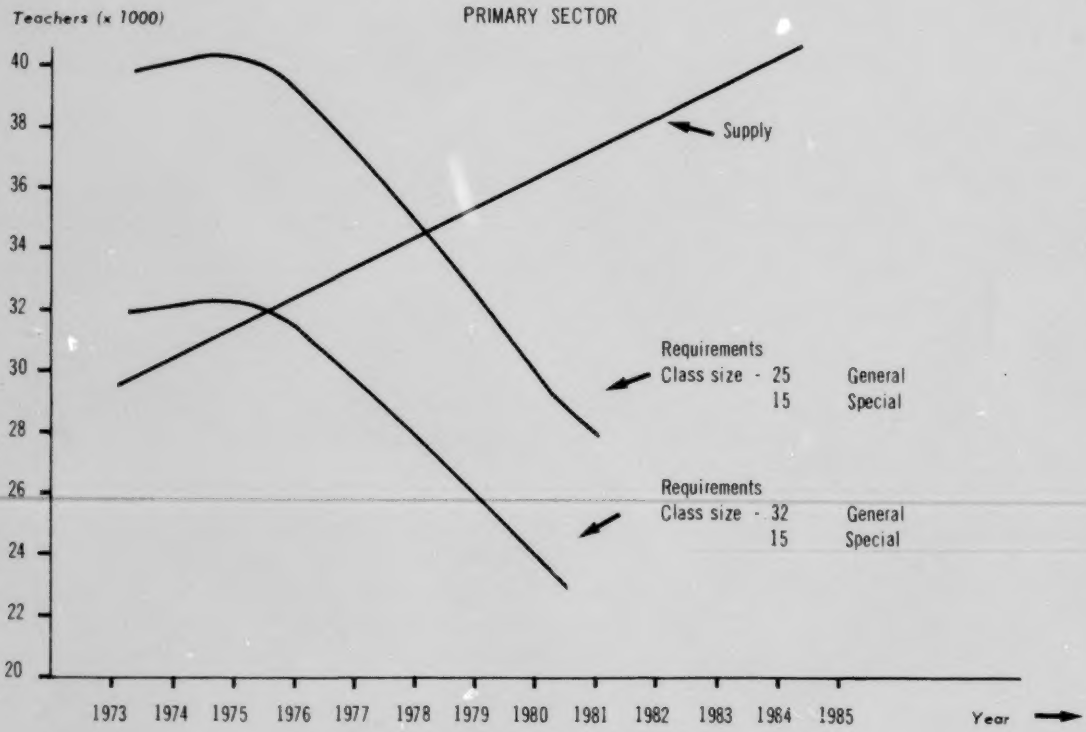
Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Preparatory requirements ('000s)	13.8	17.5	20.0	21.7	23.1	24.5	25.8	26.3	25.9	25.0	23.7	22.2	20.0

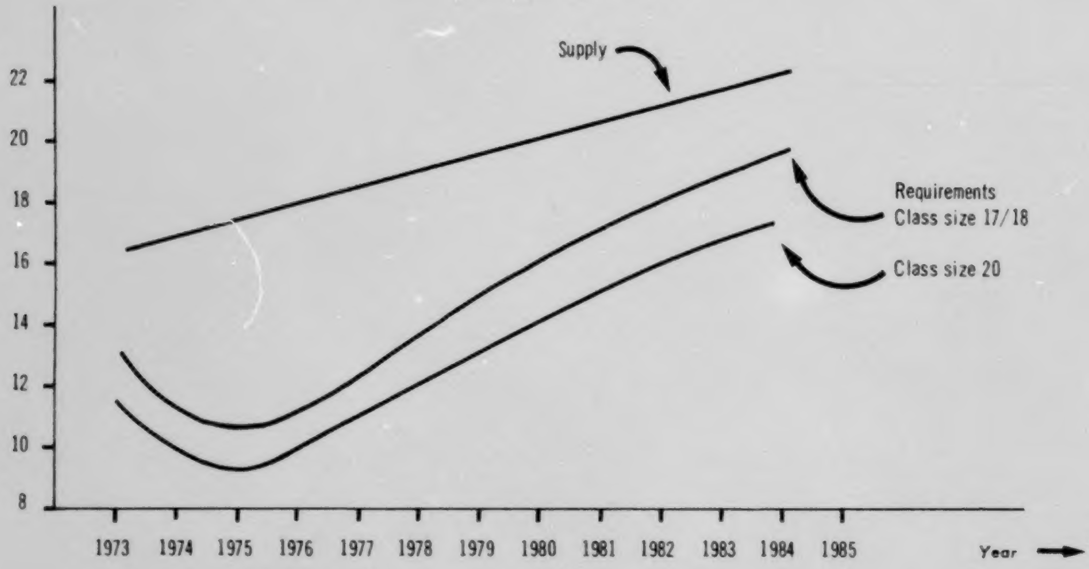
Now by assuming

- the present teacher stock of 10,000 Preparatory School teachers remains stable,
- the retraining programmes are feasible (taking one year only to retrain teachers),

Figure 12

BALANCE OF TEACHERS FOR PRIMARY AND SECONDARY EDUCATION


PRIMARY SECTOR


SECONDARY SECTOR

- an increase in the Primary School student/teacher ratio to 32 in 1976,

then it is just possible to satisfy most of the shortfalls in requirements using existing teachers.

4.3 Capital Expenditure

For each sector of education the capital expenditure required for the provision of school buildings, teacher materials, school function, level, etc. was calculated by using the results of the student flows model together with various assumptions for classroom sizes, internal migrations and the reduction in shift working in some of the present schools.

4.3.1 Primary Education

Because forecasts indicate a reduction in the demand for Primary Education over the period of the plan, (because of the demographic forecasts), it is not necessary to provide a large number of additional school buildings in this sector. However buildings are required to take account of internal migrations, reduction of shift working and the replacement of existing buildings.

Table 21 overleaf shows how the calculations of the school requirements to take account of internal migration were carried out and using a figure of 40 pupils per classroom* it is estimated that a total of 1109 additional classrooms will be required.

In addition to this it was calculated that 1364 classrooms would be required in the districts of Braga , Lisbon, Porto and Setubal to reduce the level of shift working in these areas to a more acceptable level of 25%. At present the levels of shift working in these areas are 41, 62, 45 and 39% respectively.

The third requirement for school buildings is due to many of the existing school buildings needing replacement or repair. It was estimated that over 9000 classrooms are in this condition and of these, 3950 new classrooms are required, the remainder needing repair.

Thus it was calculated that 6423 (1109 + 1364 + 3950) new classrooms are required for Primary Education at a cost of 240 thousands of escudos per classroom, giving a cost of about 1550 million escudos. In addition to this it is estimated

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* greater than the class sizes used, to allow for shift usage.

TABLE 21

SHORTAGE OF CLASSROOMS IN PRIMARY EDUCATION DUE TO INTERNAL MIGRATIONS

DISTRICTS	Existing Population in 1961	Existing Population in 1970	Internal Migrations between 1961/70	% of internal migrations between 1961/70 in regard to existing population in 1961	Forecast internal migrations in 1971/80	Corresponding number of pupils in primary education		Classroom shortage for internal migration	
						1961/70	1971/80	1961/70	1971/80
Aveiro	522 227	546 457	+ 21 601	4.14	+ 22 623	2 380	2 490	60	62
Braga	593 587	617 063	+ 5 316	0.90	+ 5 554	580	610	15	15
Leiria	400 275	382 631	+ 33 704	8.34	+ 31 911	3 700	3 510	93	88
Lisboa	1 402 586	1 611 887	+ 201 929	14.40	+ 232 112	22 210	25 530	555	638
Porto	1 191 504	1 314 794	+ 14 665	1.23	+ 16 172	1 610	1 780	40	44
Setubal	376 128	464 218	+ 71 989	19.14	+ 88 851	7 920	9 770	198	244
Viana do Castelo	275 345	250 233	+ 7 379	2.68	+ 6 706	810	740	20	18
Total			356 583		403 929			981	1 109

that 240 million escudos will be required for repairs of existing classrooms.

The Directorate of School Administration supplied estimates of the cost of teaching equipment and furniture per classroom of 6460 and 18500 escudos respectively. It was estimated that 9900 of the existing classrooms are in need of new teaching equipment.

Thus the estimated total cost of equipment and furniture was calculated at about 230 million escudos.

At the time of this study land prices were undergoing large changes and thus the total costs of the land required for school buildings could not be estimated with any confidence but by using figures of 18.5 square metres per student; (3.5 for construction, 15.0 for external areas) the land requirements for primary education were estimated at 1.83 million square metres.

4.3.2 Preparatory Education

As would be expected a large number of new schools are required for this branch of education, due to the large increase in the number of pupils. From the results of the student flows model, and by making various assumptions concerning classroom sizes and the extent of TV teaching, it was estimated that 8960 new classrooms would be required for direct teaching and 1340 for TV teaching. Of the 8960 classrooms for direct teaching, 800 would be of conventional construction (costing about 405 thousands of escudos per classroom) and the remainder, 8160, would be of a light prefabricated nature (costing 224 thousands of escudos per classroom). All the classrooms for TV teaching would be of the light prefabricated type. The cost of the buildings was calculated at 2150 millions of escudos for Direct education and 330 millions for TV education. It was estimated that repairs of existing buildings would amount to 500 millions of escudos.

For Direct Education estimates of 35 thousands of escudos and 54 thousands of escudos per classroom were obtained for furniture and materials respectively, giving a total equipment cost of 800 millions of escudos. For TV education the total equipment cost was 72 millions of escudos.

The total additional land required for Preparatory Education; using a figure of 28 square metres per student, was 8.03 million square metres.

4.3.3 Secondary Education

As with Primary Education, an allowance for internal migrations was taken into account for this sector and the total requirement for new schools was calculated as 1500 classrooms.

The cost per classroom was 560 thousand escudos for lyceum education and 650 thousand escudos for technical education. The total cost of new buildings was estimated as 910 millions of escudos. In addition temporary accommodation and repairs amounted to 180 million escudos.

For teaching materials a cost of 60 thousand escudos per classroom was used, and this, together with 35 thousand escudos for furniture gave a total cost of equipment for new schools of 145 millions of escudos. An allowance of 75 millions of escudos was also made for re-equiping existing schools.

For the land requirements in Secondary Education, a figure of 33.5 square metres per student (6.0 for building and 27.5 for external land) was assumed giving a total land requirement of 1.81 million square metres.

4.3.4 Higher Education

It was thought that a proportion of 40% of the increase in the number of students in Higher Education (63000 in 1973 to 124200 in 1970) would be absorbed by the present institutions and that new institutions would have to be built to take account of 60% of the increase, i.e. 38000 students.

In the absence of reliable data a cost of 80 thousand escudos per student for buildings was assumed giving a cost of 3040 millions of escudos, together with 300 millions for repairs, 500 millions for equipment and 3.00 million square metres of land.

In addition to these figures an allowance of 300 millions of escudos was made for student residences, sports pavillions, youth centres, childrens' playgrounds, equipment for physical education, canteen equipment, etc..

The results of the calculations are summarised in the table below.

TABLE 22 - CAPITAL COSTS

	Sector of Education				
	Primary	Preparatory		Secondary	Higher
		Direct	TV		
Number of new classrooms required	6423	8960	1340	1500	-
Cost of new classrooms	1550	2150	330	910	3040
Cost of repairs to existing classrooms	240	430	70	180	300
Cost of equipment	230	800	70	220	500
Total land required	1.83	8.03		1.81	3.00

N.B. All the costs refer to millions of escudos; land requirements are in millions of square metres.

4.4 Current Expenditure

Some of the results of applying the various models for teachers salaries and the annual costs of equipment and sundry expenditures are given below.

4.4.1 Primary Education

It was found that a model of the form $y = 0.38\ e^{0.024t}$ (t = 0 in 1950) most adequately described the growth in teachers' salaries (in terms of staff expenditure per student) over the 1960 -70 decade. This model was used, together with step changes of 26% and 49% in 1969 and 1970, and an 8% growth rate from 1970 to 1979 to provide a basis for forecasts of future staff expenditure per student. The forecast value of staff expenditure for 1979 was 2.95 (thousands of escudos per student) compared with 1.31 in 1970.

Using the figure for expenditure of 2.95 thousands of escudos per student gives a value of 25.08 for staff student ratio and just over 6000 escudos per month for teachers' salaries in 1979. It was thought that this resultant salary was too low and the calculations were repeated using a higher monthly salary of 8915 escudos in 1979.

Using this monthly salary the staff expenditures per student were calculated for various values of the staff/student ratio, the results are shown in the Table 23 below.

For equipment expenditure two alternative methods were used, the first in which equipment expenditure amounting to 10% of the total current expenditure in 1979 (the figure of 10% was based on an analysis of historical data), the second in which expenditure per student on equipment, increased at an annual rate of 13% from 1970 to 1979. These results are also shown in table 23 .

TABLE 23

Forecast of Equipment and Staff Expenditure in Primary Education in 1979

Staff Expenditure

		Total (millions of escudos)	Expenditure per student (thousands of escudos)
Student Staff Ratio	32.5	2 632 032	3.42
	30	2 847 520	3.7
	25	3 424 720	4.45

Equipment	Total	Expenditure per student
Method (a) 10% of the total (corresponding to SS ratio of 25	380 520	0.47
Method (b) 13% increase	160 220	0.20

4.4.2 Preparatory and Secondary Education (Lyceum)

Only two years of past data for Preparatory school staff expenditure was available and so this sector of education was combined with Secondary Education (Lyceum)for both sectors the teaching salaries are very similar.

It was found that the model

$$y = 2.192 + 0.004t \quad (t = 0 \text{ in } 1950)$$

most appropriately described the growth in staff expenditure per student, together with additive step changes of 0.39 and 1.4 in 1969 and 1970.

The forecast staff expenditure in 1979 was 8.15 and this gave a negligible change in student staff ratio. Two cases concerning staff student ratios were explored, one of 18 and one of 20 and the results are shown in Table 24.

Table 24 also shows the results of the two methods of calculating sundry expenditure, one in which total sundry expenditure accounts for 15% of total amount of expenditure and the other where sundry expenditure increases of 13% annually to 1979.

4.4.3 Technical Secondary Education

The model describing natural development in staff expenditure per student from 1960 to 1970 was of the form $y = 1.51 + 0.01\,t$ ($t = 0$ in 1950), with step changes in 1969 and 1970 of 0.6 and 1.8 (thousands of escudos). Because of this small slope of this line, i.e. the 0.01, there is no change in the staff student ratio caused by disparities in the rates of growth of salaries and staff expenditures per student.

The forecast rate for 1979 of staff expenditure was 7.07 thousands of escudos per student for a staff student ratio of 17. The results are shown in Table 25 together with the results for sundry expenditure.

TABLE 24

Preparatory and Secondary Education (Lyceum) Current Expenditure

	Staff Expenditure				Sundry Expenditure		
	Student/Staff ratio 18		Student/Staff ratio 20		15% of total	13% annual increase	
	Expenditure per student (thousand escudos)	Total (million escudos)	Expenditure per student (thousand escudos)	Total (million escudos)	Total (million escudos)	Expenditure per student (thousand escudos)	Total (million escudos)
Preparatory* Education (Direct)	8.15	4188	7.34	3772	739	0.53	272
Preparatory* Education (TV)	4.00	881	3.60	793	155	0.53	117
Secondary Education (Lyceum)	8.15	496	7.34	447	88	0.53	32

* Assuming 30% TV education, and 6000 escudos per month for TV monitors

TABLE 25 CURRENT EXPENDITURE FOR TECHNICAL SECONDARY EDUCATION

	Staff		Equipment	
	Student staff ratio of 17	Student staff ratio of 20	15% of total expectation	13% annual growth rate
Expenditure per student (thousands of escudos)	7.07	6.36	0.84	0.76
Total (millions of escudos)	835	752	100	89

4.4.4 Higher Education

The model for staff expenditures (g) based on the 1960-70 decade was of the following form:

$$y = 5.53 - 0.11\,t$$ (t represents time in years, with t = 0 in 1950).

with a step change of 3.47 in 1970.

The forecast staff expenditure in 1979 based on this model, together with an 8% growth rate was 11.60 thousands of escudos. This value gave a 10% change in student staff ratio from the 1970 value of 27.0 to a value in 1979 of 29.7.

The student staff ratio which it is hoped to achieve in 1979 is 25.0 and this corresponds to a staff expenditure of 13.4 thousands of escudos per student, and this value was the one that was used.

Table 26 below shows the total staff expenditure together with the results of two methods for calculating sundry expenditure and an estimate of research expenditure. The estimate for research was based on the proportion of this type of expenditure to Gross National Product in various other countries.

TABLE 26 CURRENT EXPENDITURE IN HIGHER EDUCATION

Staff Expenditure		Research Expenditure	Sundry Expenditure			
Exp.per student (thousands of escudos)	Total (millions)	Total (millions)	30% of total expenditure		13% of annual	
			Exp.per student	Total (millions)	Exp.per student	Total (mill.)
13.4	1577	602	8.1	1039	5.2	612

4.4.5 Summary

The following table shows the sum of the forecasts of current expenditure from 1974 to 1979 in the various sectors of education.

Forecast of current expenditure 1974-1979

TABLE 27

(escudos)

	1974	1975	1976	1977	1978	1979
1. STAFF						
Primary	2 797 599	3 037 830	3 324 060	3 449 078	3 545 605	3 424 720
Preparatory						
direct	1 609 702	2 072 414	2 708 310	3 184 560	3 668 243	4 188 538
TV	336 218	432 966	571 353	667 762	770 433	881 024
lyceum	368 211	330 774	333 464	368 485	445 224	496 450
Technical	484 075	430 796	441 850	543 079	697 857	835 462
Non-university	115 370	174 942	258 227	364 136	478 478	657 656
University	455 380	521 088	595 051	677 212	768 019	919 160
TOTAL STAFF	6 166 555	7 000 810	8 234 325	10 087 075	10 373 859	11 403 010
2. SUNDRY						
Primary	310 844	337 536	369 340	383 230	393 956	380 520
Preparatory						
direct	284 065	365 720	47 937	361 981	647 337	739 054
TV	59 332	76 405	100 827	117 840	135 958	155 443
Lyceum	64 978	58 371	58 847	65 027	78 569	85 409
Technical	85 425	76 o22	77 975	95 837	123 151	100 205
Non-university	49 444	74 988	1 10 669	156 058	205 062	1 039 076
University	195 162	223 323	225 022	290 234	329 151	
TOTAL SUNDRY	1 049 250	1 212 365	1 450 617	1 469 727	1 913 184	2 499 707
TOTAL	7 215 805	8 213 175	9 648 942	11 556 802	12 287 045	13 900 717

APPENDIX A

The methods used to reduce the impact of lowering the school entrance age

A.1 Introduction

Two demographic forecasts of the population of Portugal up to 1979 were used in this study, one from the Technical Secretary of "Presidencia do Consello" and the other from the I.N.E.. The former gave the population forecasts for Portugal in 1979 together with forecasts of the birth rate and the latter gave forecasts for 1971, 1976 and 1981 for the up to five years old age group.

Using the former forecasts and by making assumptions concerning proportional estimates for live births from 1968 to 1979 and constant infantile death rates and emigration rates, a linear model was used to produce forecasts of the number of new entries to Primary Education, under the present system. The number of potential new enrolments in year t (with t = 0 in 1969) was given by 185497 - 5715 t, i.e. if the present system were maintained, then because of the fall in birth rate, the number of new entries would fall at a rate of 5715 per year.

A further assumption used in the derivation of this model was that the present age structure of pupils entering Primary Education for the first time would be maintained. At present some 25% of pupils enter school for the first time at 6 years of age and 75% enter at 7 years of age.

Thus, taking 1969 as a base year then the intakes in year t would be given by $X_t = X_o - \alpha t$. Now if a and b represent the proportion of pupils of age 6 and 7 years respectively starting school for the first time in the present system, then aX_t gives the number of pupils who would normally (i.e. under the present system) start school at age 6 in year t, and bX_t gives the total for those of age 7.

If the lowering of the entrance age was made in one year in 1973 then approximate figures for new entrants would be in successive years.

1969	X_o	= 185500
1970	$X_1 = X_o - \alpha$	= 179800
1971	$X_2 = X_o - 2\alpha$	= 174100
1972	$X_3 = X_o - 3\alpha$	= 168400
1973	$X_4 + bX_5 = X_o (1+b) - (4+5b)\alpha$	= 280300

1974 $aX_5 + bX_6 = X_o - \alpha\ (5a + 6b) = 152600$

1975 $aX_6 + bX_7 = X_o - \alpha\ (6a + 7b) = 148900$

1976 $aX_7 + bX_8 = X_o - \alpha\ (7a + 8b) = 141200$

which is clearly undesirable, because of the large increase in 1973 followed by an even larger decrease in 1974.

A.2 The effects of introducing the measure over three years

Now if the measure was introduced over three years, i.e. from 1973 to 1975, then the total number of new entries over the three years would be made up from the number that would have started if the measure had not been introduced $(X_4 + X_5 + X_6)$ plus the number that would have started in 1976 at age 7 (bX_7). So if N_1,N_2 and N_3 represent the new intakes in 1973, 1974 and 1975 (these are the numbers finally required) then we have:-

$$N_1 + N_2 + N_3 = X_4 + X_5 + X_6 + bX_7$$

$$= (3 + b)X_o - (15 + 7b)\alpha \qquad \text{————— (A)}$$

Now the number of pupils in the 1st year of Primary Education in 1973 will be the sum of the new entrants and those repeating from 1972. Let the number of pupils repeating in 1973 be a_o and let k be the repetition rate. Then the numbers of pupils in the last year of Primary Education are as follows:

1973 $a_o + N_1$

1974 $k(a_o + N_1) + N_2$

1975 $k\left[k(a_o + N_1) + N_2\right] + N_3$

In order to avoid sharp peaks choose N_1, N_2 and N_3 so that these numbers are equal for the three years, i.e.

$$k(a_o + N_1) + N_2 = a_o + N_1 \qquad \text{————— (B)}$$

and $k^2(a_o + N_1) + kN_2 + N_3 = a_o + N_1$ ——— (C)

Equations A, B and C may be rearranged to form a system of three linear simultaneous equations for the three unknowns, N_1, N_2 and N_3.

Viz:-

$$N_1 + N_2 + N_3 = (3 + b)X_o - (15 + 7b)\alpha = S$$

$$(k-1)N_1 + N_2 = a_o(1 - k)$$

$$(k^2-1)N_1 + kN_2 = a_o(1-k^2).$$

These equations have a solution if $k \neq \frac{3}{2}$ of

$$N_1 = \frac{(S + a_o)}{(3 - 2k)} - a_o$$

$$N_2 = N_3 = \frac{(1 - k)}{(3 - 2k)} (S + a_o)$$

A.3 Calculation of rates of introduction

By extending this analysis it is also possible to calculate the rate at which the six year old entrance is introduced in 1973 and 1974 by putting

$$r_1 = \frac{\text{Number of 6 year olds attending school in 1973}}{\text{Total number of 6 year olds in 1973}}$$

and similarly for r_2 in 1974.

In 1973 the number of 6 year olds is $aX_4 + bX_5 = X_o - \alpha(4a + 5b) = X_o - \alpha(4 + b)$ (remember $a + b = 1$).

The number of 6 year olds attending school in 1973 is the difference between the total intake in 1973 (i.e. N_1) less the number of 7 year olds who attend for the first time (bX_4). So the number of 6 year olds at school in 1973 is

$$N_1 - bX_4 = N_1 - bX_o + 4\alpha b$$

Thus

$$r_1 = \frac{N_1 - bX_o + 4\alpha b}{X_o - \alpha(4 + b)}$$

For 1974 the number of 6 year olds is $aX_5 + bX_6 = X_o - \alpha(5 + b)$ and the number aged 6 years at school is given by the intake for 1974 (N_2) less the number of individuals of age 7 years who had not previously attended school, which is given by the number aged 6 in 1973 who did not attend school, i.e.

$$\underset{\substack{\text{No. of 6 year}\\ \text{olds in 1973}}}{(aX_4 + bX_5)} \quad - \quad \underset{\substack{\text{No. of 6 year}\\ \text{olds at school in}\\ \text{1973.}}}{(N_1 - bX_4)}$$

i.e.

$$r_2 = \frac{N_2 - (aX_4 + bX_5) + (N_1 - bX_4)}{aX_5 + bX_6}$$

$$= \frac{N_2 + N_1 - X_4 - bX_5}{aX_5 + bX_6} = \frac{N_2 + N_1 - (1 + b)X_o + \alpha(4 + 5b)}{X_o - \alpha(5 + b)}$$

A.4 The final results

Recapitulating, we have the following relationships

$$S = N_1 + N_2 + N_3 = (3 + b)X_o - (15 + 7b)\alpha$$

$$N_1 = \frac{(S + a_o)}{(3 - 2k)} - a_o$$

$$N_2 = N_3 = (1 - k)\frac{(S + a_o)}{(3 - 2k)}$$

$$r_1 = \frac{N_1 - bX_o + 4\alpha b}{X_o - \alpha(4 + b)}$$

$$r_2 = \frac{N_1 + N_2 - (1 + b)X_o + \alpha(4 + 5b)}{X_o - \alpha(5 + b)}$$

in which $X_o = 185497$, $\alpha = 5715$ — From demographic forecasts

$k = 0.333$ — From analysis of past repetition rates

$a = 0.25$, $b = 0.75$ — From analysis of demographic data.

$a_o = k \times 272000$ — 272000 is the number in the 1st class in 1972.

Inserting these values gives:-

$S = 579\ 900$

$a_o = 90700$

$N_1 = 196700$

$N_2 = N_3 = 191700$

$r_1 = 0.49$

$r_2 = 0.71$

The number of new entrants and total number in the first year of Primary Education are shown below:

TABLE A.1. New entrants and Total Students for First Year of Primary Education

Year	New entrants	Total students in 1st year of Primary Education
1972	168 400	272 000
1973	196 700	287 400
1974	191 700	287 400
1975	191 700	287 400
1976	141 200	236 900
1977	135 500	214 400

The above shows a reasonably smooth absorption of the additional pupils, with 49% of 6 year olds at school in 1973, 71% in 1974 and of course 100% in 1975.

APPENDIX B

Qualified Manpower Forecasts

B.1 Introduction

This work was carried out in an attempt to forge the link between economic and educational development by finding relationships which enable the manpower requirements, in terms of various educational levels, to be estimated in accordance with different economic growth rates in various sectors of the Portuguese economy.

The work was not used during the main study, but it is thought that the work will prove extremely useful when considering the development of the new universities, because this work enables forecasts to be made of the number of graduates, of different disciplines, required by the economy.

Some of the relationships used in this model are open to question and therefore the study does not intend to give exact numbers regarding the number of graduates required in 1979, but gives, subject to certain assumptions, an indication of the disciplines in which there may be shortages or excesses of graduates.

The study developed in three stages:

The first stage concerned a review of the work carried out in this field in order to define a methodology consistent with the available data.

The second stage involved producing qualified manpower forecasts for Portugal up to 1979. Two methods were used, one based on the occupational structure existing in Portugal in 1960, and the other was defined using international comparisons to give an occupational structure for 1979 adequate for the economic development expected for that year.

In the third and final stage the global manpower requirements derived in the second part were converted into the graduate requirements. A comparison of these estimates with those based on historical trends constituted the final part of the study.

The methodology finally adopted was essentially the one suggested by Parnes for the Mediterranean Regional Project based on the growth rate established in the economic development plans for the G.N.P..

B.2 The Methodology

The steps carried out by the model were as follows:

(i) Breakdown the expected global GNP for 1979 into the Sectorial Products corresponding to the various sectors of the economy, i.e. Agriculture, Mining, Manufacturing, etc..

(ii) Using the expected labour productivities in each sector, the total labour requirements from the sector products were calculated.

(iii) For each economic sector the total labour requirements were broken down into various occupational categories, e.g. Scientific and technical occupations, Administration workers, Clerical workers, Farmers, etc..

(iv) The total labour requirements in each sector, expressed in terms of the numbers required at each educational level, were then calculated by using a matrix which breaks down each occupation into the proportions requiring various levels of educational achievement.

(v) Finally by taking into account emigration and immigration the total graduate numbers were calculated.

The data for each of these steps came mainly from the S.T.P.C.[*]'s forecasts except that for step (iii) the parameters were calculated on the basis of international comparisons and for step (iv) figures concerning the structure of Holland in 1960 were used. Since it was anticipated that the general level of development in Portugal in 1979 would be similar to that in Holland in 1960.

For step (iii) three hypotheses were considered for each sector of the economy by making international comparisons. These are shown in the following table.

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[*] Secretariado Tecnico da Presidencia do Consello (Secretariat for Economic Planning).

TABLE B.1 International comparisons for various economic sectors

Economic Sector	Comparison		
	Hypothesis 1	Hypothesis 2	Hypothesis 3
Agricultural	France	Germany	Israel
Mining and quarrying	Belgium	Japan	Norway
Manufacturing	Japan	Germany	Britain
Construction	Japan	Germany	France
Transport and Communication	Norway	Israel	Germany
Commerce, Banking and Insurance	Britain	Norway	France
Electricity	Britain	Belgium	France
Government and other Services	Britain	Germany	Belgium

These comparisons were chosen on the basis of similar productivity increases in the last decade (1960-1970) as is to be expected for Portugal up to 1979.

The three hypotheses were chosen to represent several degrees of demand for professional, technical and related workers, hypothesis 3 showing the greatest demand and hypothesis 1 the least.

From these hypotheses and many other assumptions the model was used to produce detailed estimates of the numbers required at various educational levels. Figures B1, B2 and B3 show the numbers of Professional, technical and related workers required in 1979 under the three hypotheses, according to the following groupings:-

0.0	Architects and engineers
0.1	Physicists
0.2	Biologists, veterinarians, agronomists
0.3	Physicians
0.4	Nurses and midwives
0.5	Professional medical workers and medical technicians
0.6	Teachers
0.7	Clergy
0.8	Jurists
0.9	Artists and writers

0.X	Draughtsmen, etc.
0.Y	Other professional, technical and related workers
1.0	Administrative, executive, and managerial workers.

TABLE B.1

OCCUPATIONAL BREAKDOWN BY TYPES OF EDUCATIONAL LEVELS

Hypothesis 1

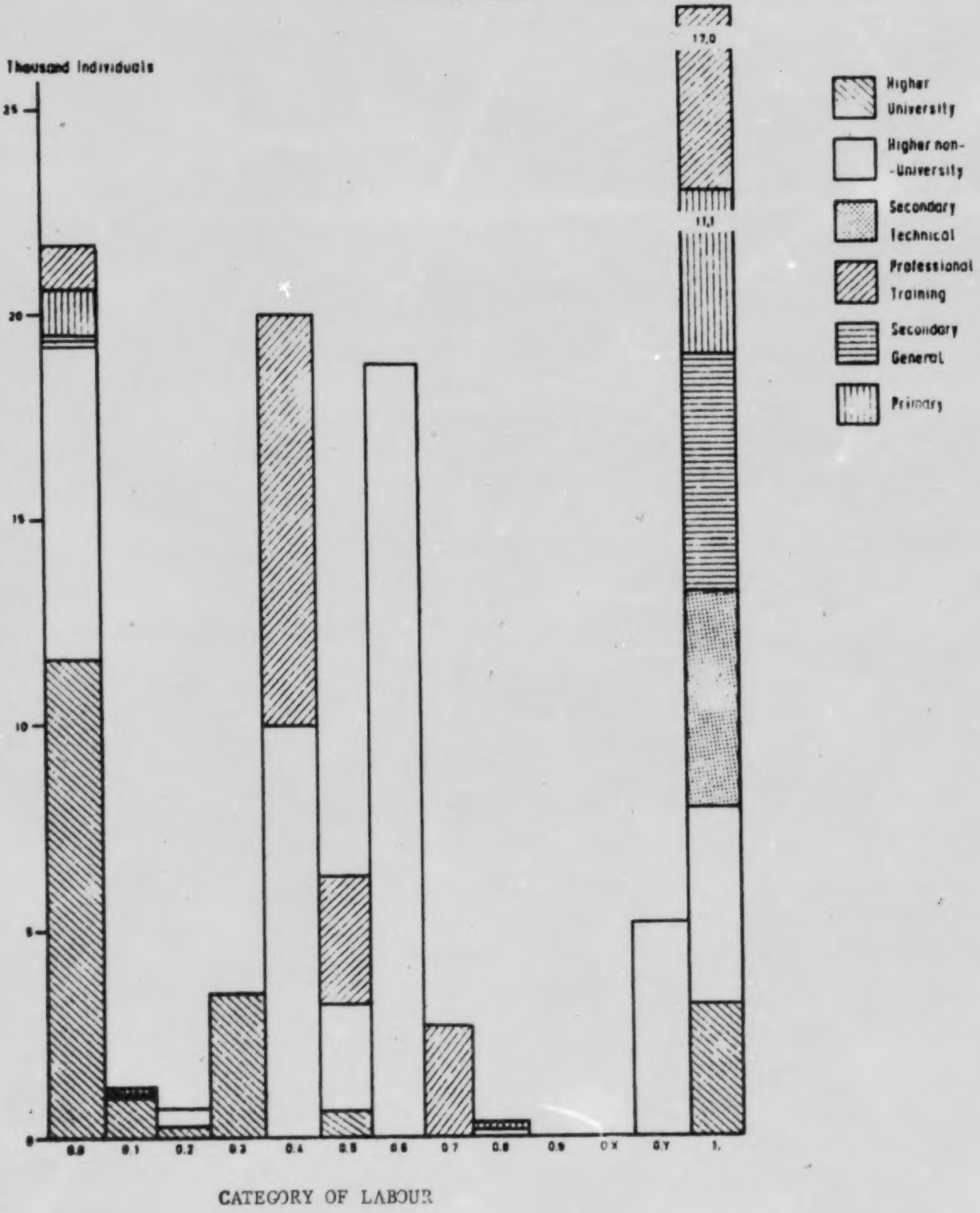


FIGURE B.2.

OCCUPATIONAL BREAKDOWN BY TYPES OF EDUCATIONAL LEVELS

Hypothesis 2

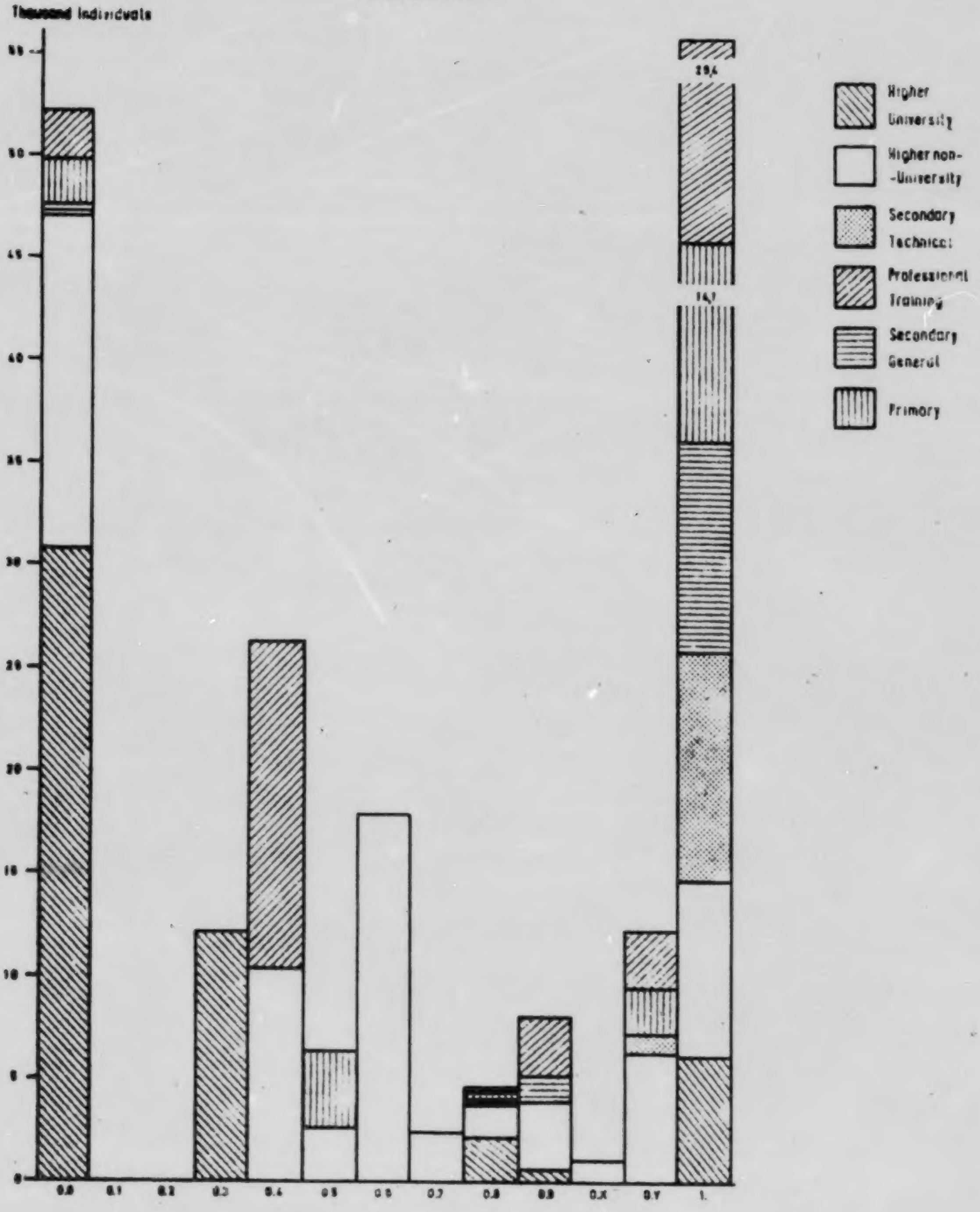
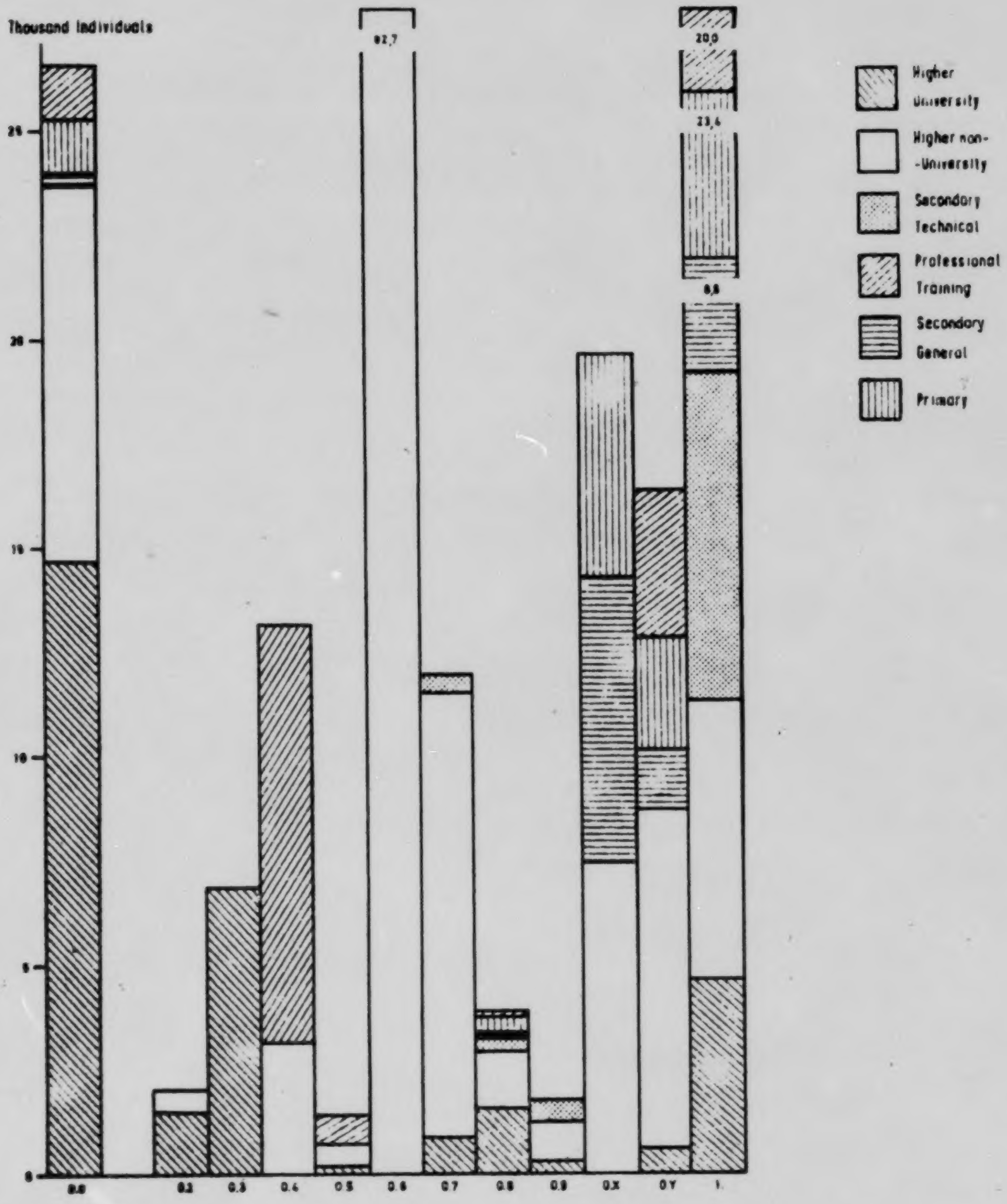


FIGURE B.3.

OCUPATIONAL BREAKDOWN BY TYPES OF EDUCATIONAL LEVELS

Hypothesis 3



APPENDIX C

The Creation of Centres of Higher Education

C.1 Introduction

An important aspect of the Projected Educational System was the development of a much expanded and more diverse system of higher education, envisaged as a set of inter-related institutions. Some of these were to be of the polytechnic type, partly designed to fulfil particular regional functions, and the location of which must therefore be closely keyed to regional characteristics. Others would be for giving higher levels of teacher training, especially for generating the additional requirements for secondary teaching, as noted in the main report. Again, the requirements of the individual regions is a dominant factor in determining where these should be located.

New universities were also required to relieve the pressure on the existing universities at Lisbon, Coimbra and Porto. These were seen as providing teaching and research functions at the highest level, and for these,regional requirements are much less important in determining location.

Thus the importance of regional characteristics in affecting locational choice varies between the different types of higher education institution. Nevertheless, the presence of any such institution will have a significant effect on a city - both in 'economic' and in 'status' terms, and in Portugal, as elsewhere, there were local "pressure-groups' making claims for their own cities as sites for new universities or similar institutions. The planning document published by the Portuguese national Education Ministry (Guidelines to the Reform of Higher Education) attempted to forestall these local pressures by declaring

> "... In its turn, the diversity of establishments planned in this sector will make possible a more rigorous selection of the types best suited to the needs felt in each region of our country. In this sphere it should be stressed that new centres of higher education should be set up preferably in zones defined on the basis of definite criteria, such as the constitution of the population of the area and its likely development, taking into account not only the urban centre but also its area of influence; the cultural level and, especially, the degree of development of secondary

> education; resources in industries and services; and the relation with the criteria for territorial planning, defined at the level of national overall and regional planning."

For the polytechnics, special analyses were carried out, taking mainly regional requirements into account, and determining "orders of preference" for the establishment of these institutions. In these analyses the notion of a minimum city size of 50,000 was introduced, for it to be a viable location. Demographic projections and employment prospects were taken into account, and particular attention was paid to the National Plan for Territorial Development, which was partly designed to arrest the population drift from the interior. When considering specific possible locations, the range of studies which should be offered was assessed by analyses of the activity levels of the various sectors of the economy, and by the views put forward by the Regional Planning Committees. In this way, sets of possible polytechnic institutions were generated, including both new institutions and the "up-grading" of some existing technical colleges. Thus these acknowledged the characteristics of each separate location, but also, at the National level, took account of the range of studies which should be available, and the National Economic and Territorial planning requirements.

To some degree, however, the preference order for the Polytechnics could not be finalised without reference to the planning locations of the new universities. For although the structures and aims of the two types of institutions are substantially different there is some overlap of studies, and the territorial development plan implied trying to avoid too much concentration of higher education on a restricted number of cities.

The question of university location is thus important, not only for its own sake, but also as a dominant factor in determining the location of the polytechnics.

As indicated in the outline above, the methodology used for determining location preferences for the higher teacher training colleges, and at least an initial list for the polytechnics is relatively well-established. But, for the new universities, with their greater flexibility in location, and with the competing claims from rival cities being pressed hard, it was necessary to develop an explicit method for determining the relative preferences.

This Appendix presents the methodology used in this exercise, and the results obtained.

C.2 The location of New Universities - A Methodology

C.2.1 Introduction

From the background presented in section C.1 above, the terms of reference for this aspect of the study can be taken as:

"To develop indicators, as objective and quantifiable as possible relevant to the problem of deciding where the new universities should be located."

It was also desirable that the analysis used should not anticipate any particular administrative or pedagogical structure for the new Universities, so that these could be defined later, without invalidating the locational analysis. It should also be noted that the new Universities were to be complete institutions in themselves, and in no sense "satellites" to the existing universities.

C.2.2 Method of Approach

The basic criteria used were related to the following concepts:

(a) ease of access to people, goods and communications;

(b) existence of adequate environmental, economic and technological conditions.

Some of these factors must be interpreted on a national level, in comparing the relative and competitive attractions of one location with another - for example, the likely "appeal" of particular locations to potential students. Others can be generated mainly from analyses of local characteristics - as with the "environmental" aspects.

Thus a number of individual analyses seemed appropriate, ranging from comparative 'national' studies to mainly local measures of location suitability. The attraction of the individual locations was measured across a range of criteria, and no attempt was made to combine these into a single measure of effectiveness. (The scope for argument created by giving relative weights to "attractiveness to potential students" and "local environmental characteristics" for example, would in any event have probably proved a disadvantage.)

But,as the results show, there is a considerable amount of convergence in the preference orders indicated, using each of the criteria separately. Fortunately, therefore, a potentially very challenging aspect of the problem posed no real difficulty. The convergence in the results also gives confidence in the conclusions despite significant uncertainties in some of the data used.

C.2.3 Locations Considered

Although it would have been possible in principle to evaluate all possible sites, there was, of course, a relatively small set of principal contenders, and the analyses were carried out with respect to these. Moreover, and reflecting the dynamic nature of the planning activity, the set of potential sites was not agreed and fixed at the outset of the study. Thus an additional location was proposed part-way through the work, and this is not represented in all the analyses.

The possible sites considered were:

Aveiro
Braga
Evora
Faro
Setubal (the late "entry").

The locations of these, together with those of the existing universities at

Lisbon
Coimbra
Oporto,

are shown in Fig.Cl, which also indicates the major centres of population.

C.2.4 "Nationally" Based Comparative analyses

Three analyses were carried out under this heading; and these are described separately below:

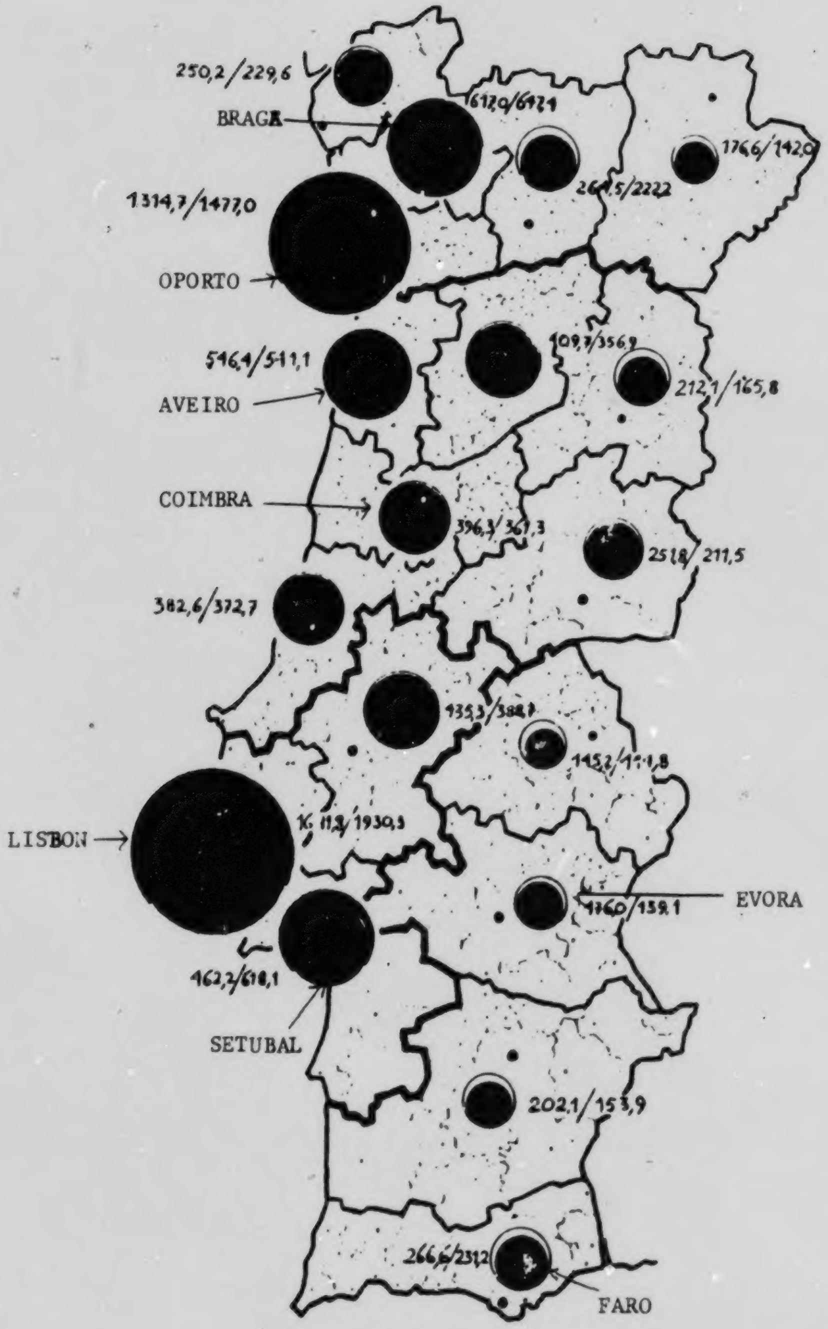

250,2/229,6
BRAGA
612,0/642,1
264,5/222,2
176,6/142,0
1314,7/1477,0
OPORTO
109,7/356,9
546,4/511,1
212,1/165,8
AVEIRO
COIMBRA
396,3/361,3
251,8/211,5
382,6/372,7
135,3/388,1
145,2/141,8
LISBON
1611,2/1930,3
EVORA
176,0/159,1
462,2/618,1
SETUBAL
202,1/153,9
266,6/231,2
FARO

FIGURE C.1 UNIVERSITY LOCATIONS CONSIDERED

The 3 existing locations, plus the 5 new sites evaluated are indicated. The diagram also shows the major population centres; for which the figures (x/y) given at each location denote.

x 1970 population (x 1000)
y 1980 population (x 1000)

C.2.4.1 Potential Population for a location

Clearly the relative accessibility of any university location to the population centres in the country is of importance. Various forms of gravity model have been proposed for such analyses, but the one used here is that due to J.Q. Stewart, who defines

"Potential population" at any point i, distant d_{ij} from actual population centres of size P_j as $V_i = \sum_j (P_j/_{dij})$

Considering each district j of the country, and assuming its population P_j is centred at its capital C_j and measuring distances d_{ij} by road from C_j to each possible university location i, we obtain the following results

TABLE C.1
"Potential" population : V_i

Lisbon	Oporto	Coimbra	Braga	Aveiro	Evora	Faro	*
76 600	90 400	69 200	84 900	75 900	43 100	26 900	

The high values for Oporto, Braga and Aveiro result from the fact that they are "within" the areas of high population density. Coimbra with a main "hinterland" of low density, benefits, however, from the influence of the high populations in the North and from the conurbation in Lisbon. Evora and Faro are far from the gravity centre of the continent's population and from that reason their potential is low, as shown in the figures above.

C.2.4.2 Communication aspects

Two measures of this were used. The first relates to the density of roads in the vicinity of each potential location. Taking, for example, the total number of kilometers of national roads contained in a 20 km radius from the boundaries of each locality, we obtain the following results.

---

* Setubal not considered.

TABLE C.2

Length of National Roads within 20 km (in Kms)

Lisbon	Oporto	Coimbra	Braga	Aveiro	Evora	Faro
290	380	380	390	330	180	170

The density of the road structure in the northern coastline region is high compared with the South and both Evora and Faro score poorly.

A more sophisticated measure was computed from the distances to locations of specific importance - viz. to the centres of district centres. But the number of such locations, and their distances from potential university sites are relevant. It also seems likely that the effectiveness of communication may be affected by the number of links in the road network required to reach the location.

Thus, referring to Fig.C2 , which shows the road links from Aveiro to "local" district centres, 6 are accessible by a single link, while from these 6, a further 10 centres are accessible by a further single road link.

The table below shows the number and average distance to district centres from each possible university location, both for "single-stage" and for "two-stage" access.

TABLE C.3

Access to District Centres - Numbers and Average Distances (Kms)

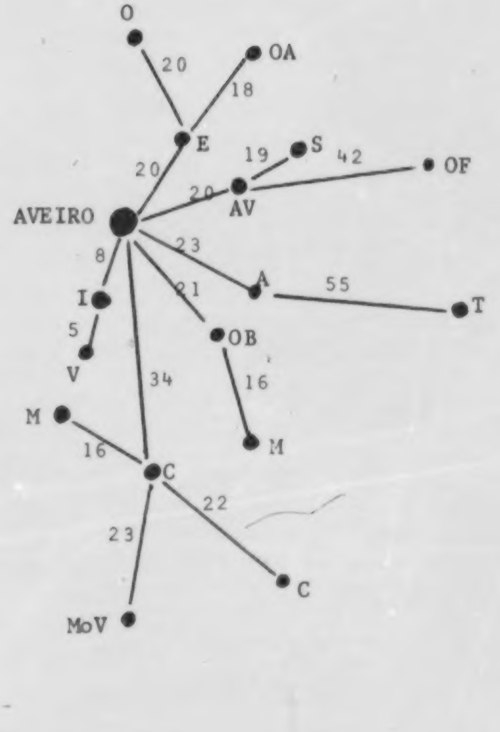
		Lisbon	Oporto	Coimbra	Braga	Aveiro	Evora	Faro
Number of centres	Single Stage	5	5	8	6	6	7	6
	Two-Stage	8	10	11	12	10	10	4
Average road distance to centres	Single Stage	14.0	6.2	22.0	18.6	21.0	34.3	35.8
	Two-Stage	26.1	28.8	32.4	27.5	36.6	48.3	72.0

The relative isolation of Evora and (particularly) Faro are well indicated by these results.

FIGURE C.2

Road links from a potential university location to district centres

The figure shows links from Aveiro to all district centres, with both single and two-stage links being indicated. The length of each link is shown (kms).


O
20
OA
18
E
20
19
S
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OF
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AV
AVEIRO
8
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T
I
21
5
OB
V
34
16
M
M
16
C
22
23
C
MoV

C.2.4.3 Potential Student Population

In Portugal, students may enrol at any university, but both university "attractiveness" and distance from home are thought to influence student choice.

Thus again some form of 'gravity' model was envisaged - though in this case a measure of 'attractiveness' is not immediately apparent.

Using data on the number of students arising from each of the 18 districts in metropolitan Portugal, and how many students attended each of the existing three universities, an analysis was carried out to identify a usable "attractiveness" index - and hopefully one which could then be used to estimate likely student populations when new universities were added to the current set.

Several plausible models were explored, but the one which gave the best correlation between "predicted" and "actual" student numbers was related simply to the size of the university, as measured by the number of teaching staff; distance was again given a strictly inverse weighting.

Thus, if

d_{ij} = road distance from district capital i to university j,

D_j = number of teaching staff in university j,

P_i = number of university students from district i,

we have

$$P_{ij} = \frac{K.P_i\,D_j}{d_{ij}} \quad \text{as the estimator}$$

for the number of students from district i attending university j.

This model, which is purely pragmatic, gave excellent correlations with actual numbers - the least good being for the university of Coimbra, which is, of course, the oldest university in Portugal, with several strong and highly regarded faculties, which may partially override the "size" aspects.

[It should be noted that the "attractiveness" measure is based on very little data, and as such may be less reliable than the distance effect, for which a strong correlation undoubtedly exists.]

Using this model it was then possible to estimate how future student populations might be distributed between universities - assuming new ones of given "size" to be established at various locations.

Table C.4. shows the results of several such exercises. For example, the first set (A) shows the current set of universities, and the last (E) estimates how the same number of students might be distributed if new universities (each of size equivalent to 30% that of Lisbon) were set up in each of Aveiro, Braga and Setubal.

The results show the relative insensitivity of student numbers to be expected at Faro and at Evora to increasing university size - it would indeed by difficult to make these both viable in size and economic in staff. On the other hand, both Braga and Aveiro can become comparable with Oporto, while a university at Setubal would be very beneficial in relieving the pressure on Lisbon.

C.2.5 Suitability of Local Environment

Universities are no longer monastic institutions, and have a large amount of interaction with the local community. They both stimulate, and depend upon, the cultural, economic, commercial and industrial activities of the region. It is clearly disadvantageous to place a new university into a situation where no reasonable infrastructure of services exists - from building to printing and from banking to hotels.

The levels of such services required to support a university cannot be specified with any precision. Furthermore, accurate data on the existence of these services is difficult to obtain. Nevertheless, using such data as was available, it was possible to compare the apparent levels of some facilities, and of some general environmental factors obtaining at each of the potential university locations. Such analyses, of course, are very different in nature from those presented above in C.2.4.1, which were based solely on size of population. For we are here seeking to assess the diversity of levels of professional and technical development, and these are not necessary correlated with population size.

Three main sets of data were used:

(a) From the Commercial Yearbook,

- number of qualified professional people,
- number of newspapers published locally,
- hotels, booksellers, printers, etc..

(b) Also from the Commercial Yearbook (and relevant to the technological activities which might be associated with a university development)

- industrial activities requiring a reasonably high level of technology,

(c) From the Economic Planning Secretariat's publication "The Continent's Urban Network - Hierarchy and Functioning",

- data on the level of commercial, industrial and professional activity, and on communication aspects.

Though the indicated preference orders from the various potential locations were not identical in each of these analyses, there was again a substantial degree of agreement, with

Braga, Setubal and Aveiro being generally preferred to Evora and Faro.

Unfortunately, because of data difficulties, and availability of resources, it was not possible to pursue other analyses in this area. In particular, it would be useful to study

(d) the likely economic impact of establishing a new university in each potential location,

(e) the residential capacity, and subsequent ability of each location to offer sufficient lodgings to a future student population.

C.2.6 Conclusions

From all the analyses carried out, both of the potential attractiveness of each location in the context of the National University "network", and from the individual suitability of each, the relative preferences were:

1. Setubal (equivalent in many senses to an additional university in Lisbon).
2. Braga.
3. Aveiro.
4. Evora.
5. Faro.

It should be noted that the above ranking represents the results of objective measures only - as required in the terms of reference. But it is acknowledged that there may be other factors influencing the final choice of location - in particular the pressures for establishing a university at Evora are considerable.

Nevertheless, the analysis described here provides a useful and defensible basis on which to conduct the further "political" debate.

TABLE C.4

Estimated Student Populations according to size and location of Universities

	Relative size of University (Lisbon 100%)	Lisbon	Oporto	Coimbra	Aveiro	Braga	Evora	Faro	Setubal
Set A	= 100	21 000							
(Current situation)	= 40		5 800	8 000					
	= 30								
	= 20								
	= 0				0	0	0	0	0
Set B	= 100	16 700							
	= 40		5 600	6 200					
	= 30								
	= 20					3 000	1 600	1 300	
	= 0				0				0
Set C	= 100	15 000							
	= 40		5 000	5 500		4 700	2 600	1 900	
	= 30								
	= 20								
	= 0				0				0
Set D	= 100	15 600							
	= 40		5 500	5 800					
	= 30								
	= 20				2 200	2 900			2 100
	= 0						0	0	
Set E	= 100	15 100							
	= 40		4 900	5 400					
	= 30				3 000	3 600			3 000
	= 20								
	= 0								

APPENDIX D

A Simple Linear Programming Formulation

D.1 Introduction

Although not used in the main study this work was carried out to give an indication of the problems which would be encountered during the expansion of the basic education from 6 to 8 years.

The problem of determining an expansion profile to accommodate the development of basic education may be expressed as a Linear Programming problem; the objective function representing the degree of attainment of full implementation of basic education in year 1979/80. The constraints in the system being those of classroom availability, teacher supply, the numbers of students requiring education together with a constraint representing the capability of the administrative machinery to handle large increases in numbers of students in successive years. In practice there are many other constraints, for example, financial restrictions, but these were omitted in this analysis and the L P model was regarded as a simple method of looking at the global implications of the proposed developments in Preparatory and the first stage of Secondary Education.

D.2 The L P formulation

The variables used in L P formulation were as follows, the subscript i denoting the year ($i = 1$ for 1973/74 up to $i = 7$ for 1979/80).

e_i - the potential number of students

x_i - the actual number of students receiving education

S_i - the number of classrooms available

P_i - the number of teachers available

s - classrooms per students (i.e. the inverse of the number of students per classroom)

p - teachers per student (i.e. the inverse of the student teacher ratio)

α - the rate at which unused classrooms in one year will be available in the following year

β - the rate at which teachers not required in one year will be available in the following year

γ - the rate at which students, unable to attend school in one year because of the various constraints, are prepared to begin the following year.

δ - the maximum percentage increase in the number of pupils from one year to the next.

D.2.1 The Constraints

Using these variables the constraints on the system may be expressed as follows.

Classrooms

During year i, it will only be possible to occupy the available classrooms at the time, plus the non-occupied classrooms in previous years still available, i.e.

$$x_1 s \leq S_1$$

$$x_i s \leq S_i + \sum_{j=1}^{i-1} (S_j - x_j s)\alpha^{(i-j)} \qquad \text{for } i = 2, \dots 7$$

Teachers

The constraint on the number of teachers is the number of teachers available at the time, plus some proportion of the teachers not used in previous years, i.e.

$$x_1 p \leq P_1$$

$$x_i p \leq P_i + \sum_{j=1}^{i-1} (P_j - x_j p)\beta^{(i-j)} \qquad \text{for } i = 2, \dots 7$$

Students

The total number of students in year i is constrained by the number of potential students in that year plus a proportion of those students unable to attend in previous years, i.e.

$$x_1 \leq e_1$$

$$\text{and} \quad x_i \leq e_i + \sum_{j=1}^{i-1} (e_j - x_j)\,\gamma^{(i-j)} \qquad \text{for } i = 2, \dots 7.$$

Administration

In order to ensure a steady absorption of the additional students into the system a constraint was introduced to ensure an increasing number of students from year to year, i.e.

$$x_i \geq x_{i-1} \qquad \text{for } i = 1, \dots 7$$

On the other hand, it was necessary to constrain the increases from year to year to represent the capability of the administration machinery to handle the increased numbers of students,

$$x_i \leq (1 + \delta)\, x_{i-1} \quad \text{for } i = 2, \dots 7$$

D.2.2 The Objective Function

The main objective was to have the greatest possible numbers of students during the period under consideration, with special importance to the last year, in which it is desirable to have 100% attendance. Thus an objective function of the following form was used:-

Minimise:

$$\pi_1(e_i - x_i) + \sum_{i=2}^{7} \pi_i \{e_i + \sum_{j=1}^{i-1} (e_j - x_j)\,\gamma^{(i-j)} - x_i\}$$

Where π_i represents the importance attached to the rate of attendance in year i. During runs of this L P model the values of the π_i's used were as follows:-

$$\pi_i = 1 \text{ for } i = 1, \dots 6 \text{ and } \pi_7 = 10^3$$

In this way the problem of expansion of basic education was formulated in terms of a Linear Programming problem with 7 variables and 34 constraints.

D.3 The Parameters

The parameters used in the model are of two kinds; normative parameters for which the values were chosen by discussion together with some analyses of past data; and calculated parameters, for which more realistic estimates could be made using demographic forecasts, etc..

D.3.1 Normative parameters

The values used are shown below:

(a) $s = 0.03$ representing a density of 33 students per classroom.

(b) $p = 0.04$, i.e. 25 students per teacher.

(c) $\alpha = 1$, giving no spoilage of unused classrooms.

(d) $\beta = 0.05$, i.e. 5% of teachers who are not used in one year will be available in the following year.

(e) $\gamma = 0.05$, that is, 5% of potential students who do not attend school in one year will be able to attend in the following year.

(f) $x_0 = 200\ 000$ being the number of students in the levels of education being considered for 1972/73.

(g) the number of classrooms available in 1973/74 was assumed to be 6000, with a maximum growth of 2000 per year.

(h) Various values of δ were used representing a wide range in the maximum growth in the number of students from year to year. The values used were 30%, 40%, 50% and 70%.

D.3.2 Calculated Parameters

The number of potential students and teachers were calculated on a more rigorous basis than that for the other parameters, first of all because these variables were the most important ones in the model and secondly the data was available to calculate them.

Potential Students

These numbers were calculated using the forecasts of population growth over the 1970/80 decade and by assuming certain transition rates between education levels. The method used was not as rigorous as the Student Flows Model but, in retrospect, the numbers obtained seem realistic. The following table gives the potential students for each year.

TABLE D.1. Potential Students

Years	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
e_i	550 200	653 480	718 200	753 630	776 120	790 650	801 590

Available Teachers

The teachers available were calculated on the basis of an original stock of teachers plus a proportion of surplus teachers in Primary Education together with a proportion of the output of the Higher Education system. The method took no account of teachers retiring or leaving the profession.

TABLE D.2. Available Teachers

Year	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
P_i	15956	16845	17797	19455	21874	25797	31976

D.4 The solutions to the LP formulation

The method used to provide a single solution to the problem involved carrying out 4 runs, corresponding to the four values for δ, and then calculate an 'average' solution based on these four results.

The four solutions had the following characteristics.

(i) $\delta = 30\%$

The increase in student numbers is restricted by the small value of δ in years 1 to 6, and by the classrooms constraint in the last year.

(ii) $\delta = 40\%$

The student numbers are restricted by the classrooms in the initial year, by the value of δ in the intermediate years, and by both the teachers and the classroom constraints in the final year.

(iii) $\delta = 50\%$

Same behaviour as for (ii).

(iv) δ = 70%.

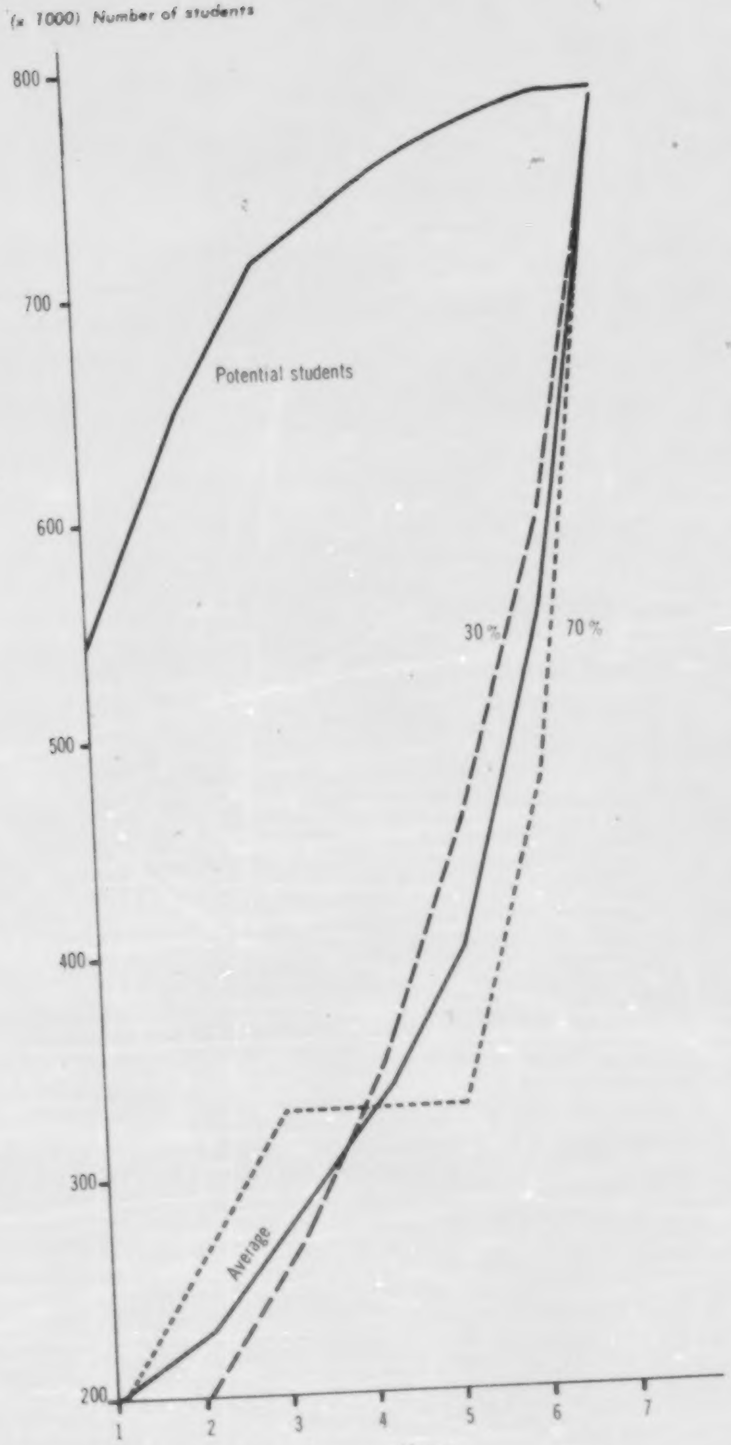
More or less than same solution as for (ii) and (iii) except that the classrooms constraint comes into operation in years 2 and 3.

Using these solutions, an 'average' solution was calculated which deviated by no more than 15% from any of the above four solutions. Figure D.1 overleaf shows two extreme solutions together with the 'average' solution, which is also tabulated below.

TABLE D.3 The number of students for the 'average' solution

Year	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Number of students (000's)	200	230	280	330	400	540	780

Figure D1
THE L P SOLUTIONS



APPENDIX E

School System Dynamics

E.1 Introduction

The Student Flow Model described in the main body of this report was used to simulate the flows of pupils through the school system. The model was written as a computer program and even with the added flexibility resulting from the use of this facility, a large amount of time was spent in calculating the effects of the various strategies. Because of the large number of variables in Student Flows Model it was often very difficult to find the precise cause of certain curious effects in the results.

As an alternative to the Student Flows Model the School System Dynamics approach was developed. Although never actually used during the course of this present study, it is felt that it will make a valuable contribution to the more detailed study of Higher Education which will be carried out at the later date.

The main advantage of the School Dynamics model is that it makes it possible to calculate directly the long term effects of various policies without recourse to lengthy simulation runs.

Consider the simple situation of one level of education with repetition rate r and let x_t be the number of students in year t. Then we may write

$$x_t = y_t + r\,x_{t-1}$$

where y_t represents the new entrants to the level, either from outside the educational system or from lower levels within the educational system. By assuming the linear form for the variable y_t, of

$$y_t = y_o + \Delta.t$$

a stationary solution for the variable x_t of the form $x_t = x_o + a.t$ may be found.

It is required to find x_o and a.

Now

$$x_1 = y_o + \Delta + r\,x_o$$

and $x_2 = y_o + 2\Delta + r \left[y_o + \Delta + r\ x_o \right]$

But due to the linearity $x_1 - x_o = a = x_2 - x_1$

substituting gives $y_o + \Delta + x_o(r - 1) = r\ y_o + \Delta(r + 1) + x_o(r^2 - r)$

Rearranging yields

$$x_o = \frac{(y_o + \Delta)}{(1 - r)} - \frac{\Delta}{(1-r)^2}$$

The other parameter may be calculated by,

$$a = y_o + \Delta - x_o\ (1 - r) = \frac{\Delta}{(1-r)}$$

Therefore there is a solution of the form $x_t = x_o + a.t$

with $x_o = \dfrac{y_o + \Delta}{(1-r)} - \dfrac{\Delta}{(1-r)^2}$

and $a = \dfrac{\Delta}{(1-r)}$.

These equations make it possible to calculate the long term effect of various assumptions for repetition rates and the rate of change of new enrolments.

E.2 The effect of sudden large changes to the system

Impulse changes

A large increase in the input variable, sustained for one year, maybe represented mathematically by the impulse variable I(A,T) representing a large change of magnitude A in year T,

i.e. $I(A,T) = 0$ for $t \neq T$
and $I(A,T) = A$ when $t = T$.

The solution for x_t for this situation is as follows:-

$$x_t = x_o + at + A\,r^{(t-T)} \qquad \text{for } t \geq T$$

and $$x_t = x_o + at \qquad \text{for } t < T$$

with x_o and a as before.

The effect of the term $Ar^{(t-T)}$ is to introduce an increase of magnitude A into the system at time T, and because of the repetition rate, the effect of the increase is dissipated gradually over time. Figure E.1. overleaf shows the effect of an impulse I (1,0).

Step Changes

Step changes to the system, which are impulses sustained indefinitely, may be represented by the Heavyside function H(A,T), representing a step change of magnitude A, commencing at time T, i.e. $H(A,T) = A$ for $t \geq T$

and $H(A,T) = 0$ for $t < T$.

The general solution representing the effect of the Heavyside function is:-

$$x_t = x_o + at + \frac{A}{(1-r)}\left[1 - r^{t-T+1}\right] \qquad \text{for } t \geq T$$

$$x_t = x_o + at \qquad \text{for } t < T$$

with x_o and a as before.

The effect of the Heavyside function is shown in Figure E.2 overleaf.

It is possible to represent any pattern of disturbances using these two functions. For example, suppose we have the following disturbances superimposed on a stable situation:-

t	0	1	2	3
Disturbance	100	50	80	200

These may be represented by the function H(50,0) + I(50,0) + I(30,2) + I(150,3).

Figure E.1
RESPONSE TO AN IMPULSE I (1,0)

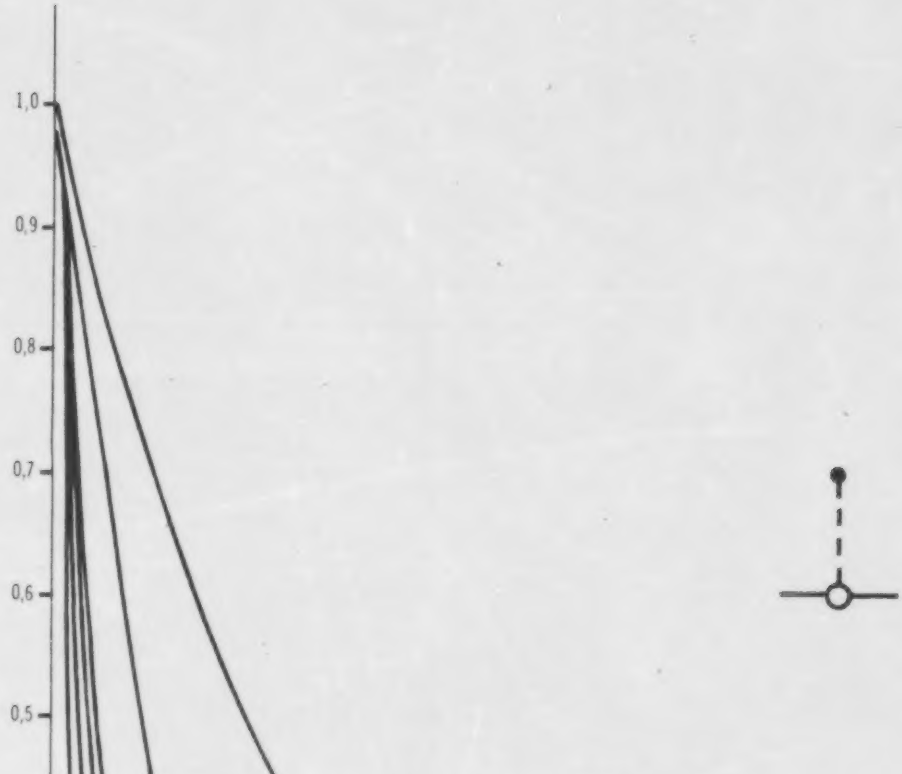
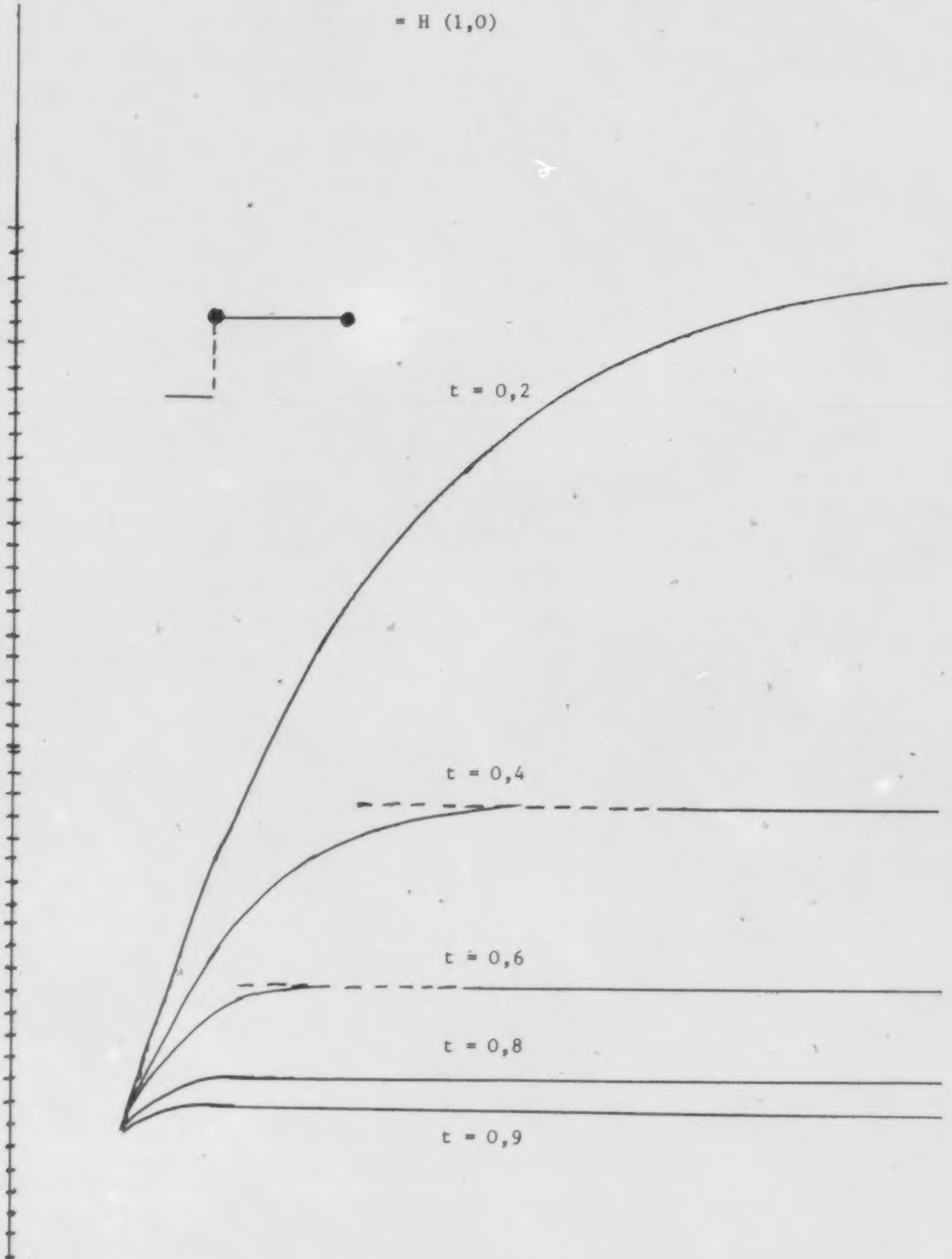


FIGURE E.2. RESPONSE TO THE HEAVISIDE FUNCTION

= H (1,0)



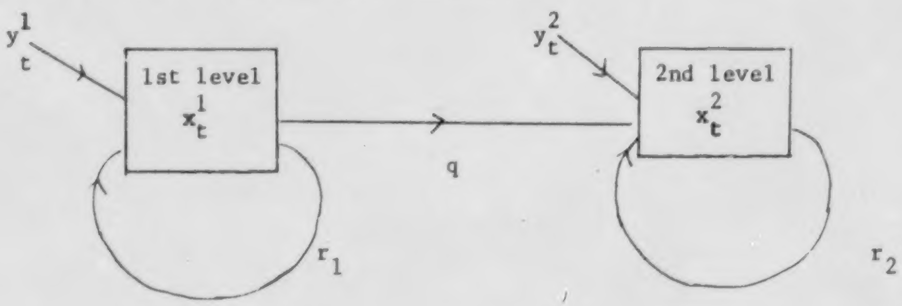
250

The effects of each of these disturbances may be added, term by term, to the stable solution to produce an analytical solution corresponding to this set of disturbances.

E.3 Systems in series

So far only the theory corresponding to the simple situation of one level of education has been described, but this may be developed to take account of interactions between two or more levels. For example, consider the situation shown in the diagram below for two levels.

FIGURE 3 A system with two levels in series



With $y_t^1 = y_o^1 + \psi_1 t$

and $y_t^2 = y_o^2 + \psi_2 t$,

Then the solutions for x_t^1 and x_t^2, the numbers of students at the two levels at time t are given by:-

$$x_t^1 = x_o^1 + a_1 t$$

$$x_t^2 = x_o^2 + a_2 t$$

with $a_1 = \dfrac{\Delta}{(1-r_1)}$ $\qquad x_o^1 = \dfrac{y_o + \Delta}{(1-r_1)} - \dfrac{\Delta}{(1-r_1)^2}$

$$a_2 = \frac{q}{(1-r_2)} \qquad x_o^2 = \frac{q(1-r_1)}{(1-r_2)} \left[x_o^1 - \frac{\Delta}{(1-r_1)\ (1-r_2)} \right]$$

In the same way as for the simple system, it is possible to take account of disturbances to any part of the system using the Impulse and Heavyside functions.

This theory was tested on the Primary Education sector by considering the four levels in parallel with new entrances in the first level only. The pattern of new entrants, calculated in Appendix A is shown in the following table.

TABLE E.1. New entrants to Primary Education

Year	New entrances
0	179.8
1	174.1
2	168.4
3	196.7
4	191.6
5	191.6
6	141.2
7	135.5
8	129.8
9	124.1
10	118.3

This sequence may be represented by $y_0 - 179.8 = \Delta = -5.7$ together with $H(-4.4,3) + I(38.4,3) + I(39.0,4) + I(44.7,5)$.

The effect of these disturbances on each level of education is shown in the diagram overleaf and these effects were added to the stationary solution to calculate the numbers of pupils at each level for up to 10 years ahead.

The results agreed very well with the results for the student flows model but have the advantage that sensitivity analyses, in the respect of various parameters, is much more easily carried out.

Table E.4

DISTURBANCE FUNCTIONS

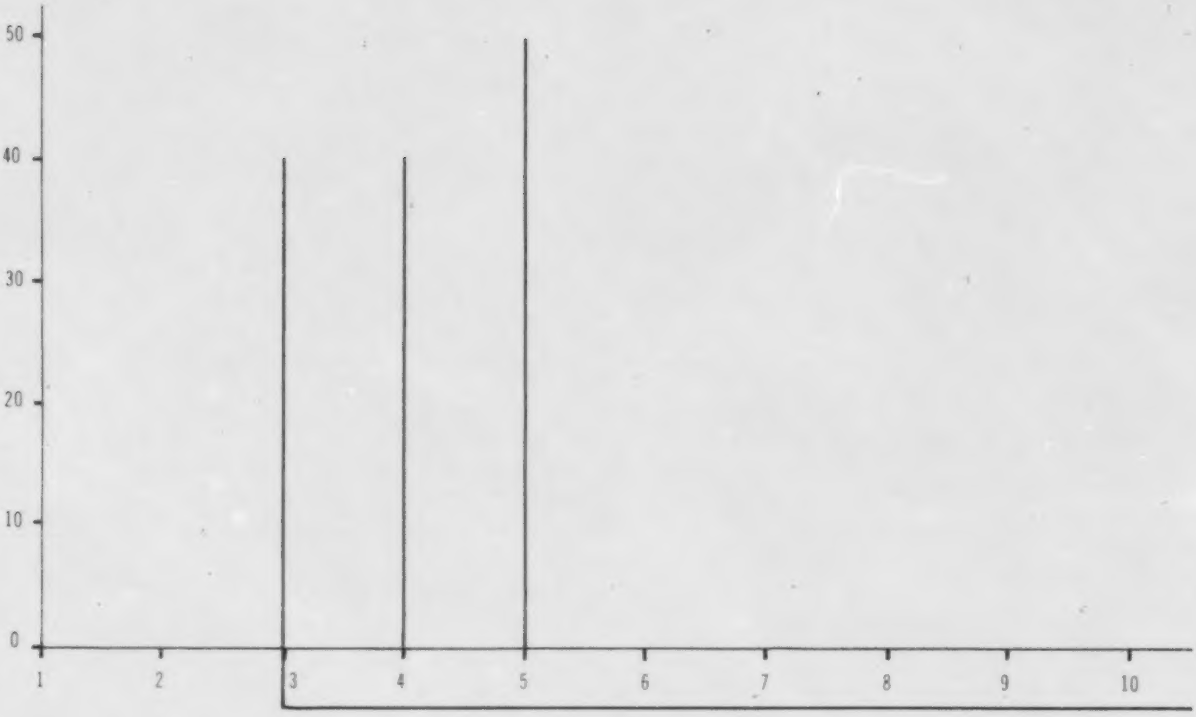
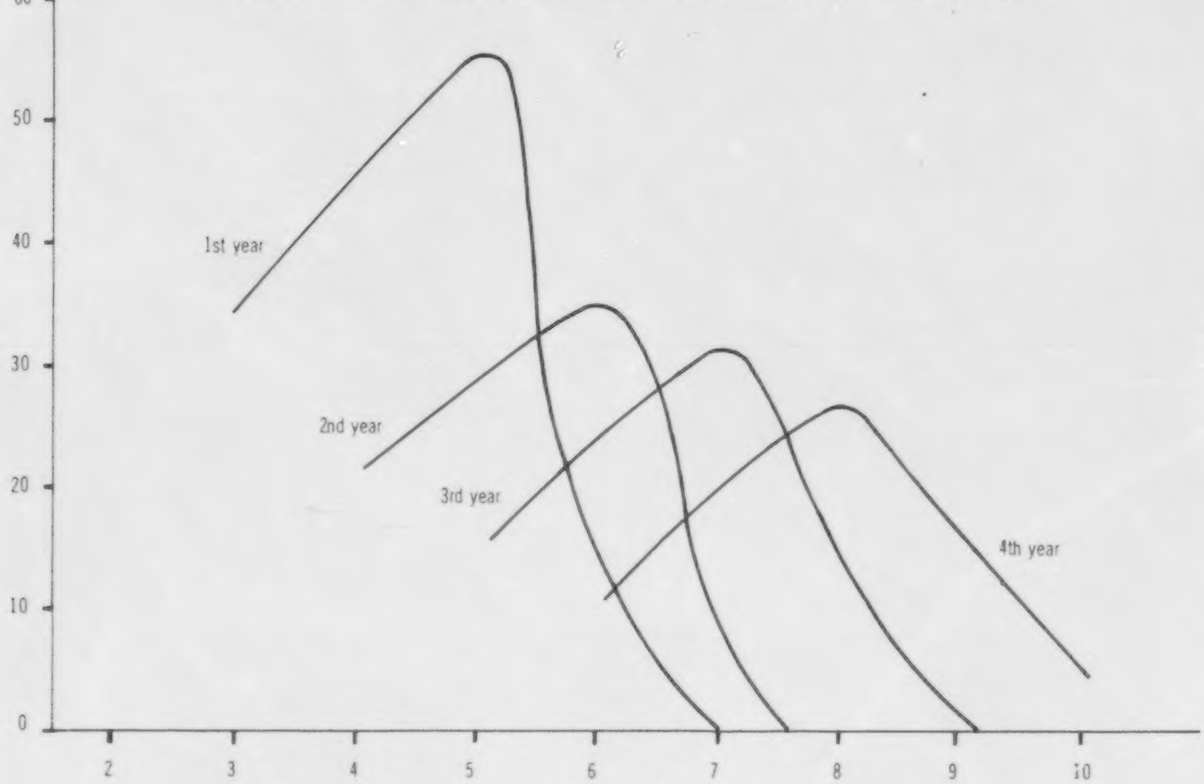


Table E.5

THE EFFECT OF THE DISTURBANCE FUNCTIONS AT VARIOUS LEVELS



TURKEY

FOREWORD

This shortened version of the Turkish Report was prepared by Dr. Güclüol from the case-study carried out for the OECD programme on Planning and Management of Educational Systems in the Mediterranean Member Countries, which was completed at the end of 1973.

The main purpose of the Turkish project was to study the existing administrative organisation of the formal educational system at the regional and local levels with a view to:

- analysing the functioning of the educational administration and possibly evaluating its performance;
- suggesting necessary changes to facilitate the work of the administration in implementing the objectives of the educational system;
- drawing, possibly, more general lessons for future research analyses in this area.

The project was confined to the regional administrative sub-systems as a complement to a separate study of the re-organisation of the central structure*.

The study was carried out by a team of Turkish administrators and experts under the guidance of Dr. K. Güclüol. The co-operation and active help of Doç. Dr. Ziya Bursalioglu, Doç. Dr. Hüsnü Arici, Dr. Niyari Karasar, Dr. Galip Karagözoglu and Dr. Nurettin Fidam should be acknowledged.

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* The last study of the re-organisation of the central structure took place in 1971 through a joint study by the OECD and the Turkish National Ministry of Education. Provincial and local administrations were not included.

CHAPTER 1

INTRODUCTION : BACKGROUND INFORMATION

1.1 General Structure of the Turkish Educational System

The Turkish national educational system is made up of two main parts: formal education and non-formal education. Formal education covers pre-school, basic, secondary and higher education. Non-formal education covers all educational activities outside the formal educational system.

(a) Pre-school education

Pre-school education is for children who have not reached the age of compulsory basic education.

(b) Basic education

This education is for children between 7 and 14 years of age. It is made up of a five-year first cycle and a three-year second cycle of education. These cycles may be in separate units, or in the same establishment.

(c) Secondary education

Secondary education, which follows basic education, covers all general, vocational and technical institutions. Every student who has completed basic education may go on to secondary education and the conditions of horizontal and vertical transfers among various programmes or secondary schools are arranged by the Ministry of National Education.

(d) Higher education

The higher educational institutions in Turkey are universities, academies and higher schools. The principles which guide the objectives, the setting up and the running of universities and academies are to be found in the regulations of the universities and academies themselves. While higher schools are more or less run by the Ministry of Education, most universities and academies have both administrative and academic autonomy.

(e) Non-formal education

Non-formal education exists alongside the organised system of education and is intended particularly for those who have never had any formal education, or who left formal education at any given moment. Non-formal education is organised in such a way as to form a whole with organised education. It is made up of two basic parts: general education and vocational and technical. These two types of education should be mutually supporting.

1.2 The Administrative Organisation of the Turkish Educational System

After the proclamation of the new Republic of Turkey, the National Ministry of Education became the only organisation in charge of all educational institutions, with the exception of universities and academies, and certain institutions such as schools of health technicians and schools of agriculture which are run by other ministries.

Up to 1931, there were twelve regions in Turkey and the educational activities in each region were under the direction of a Superintendent of Education ("Maarif Emini"). He had the right to appoint, sanction and remove the personnel in primary education and was responsible for the financing of primary schools out of the provincial budget allocations for primary education. He also had some control over the secondary schools through his contacts with the local board.

In 1931, provinces became the political and educational units. The educational budget was included in the general budget, but the "special provincial budget" still exists for activities concerned with primary education. The central administration has the authority to appoint and dismiss secondary and primary school teachers and principals.

Since 1949, all ministries have had a branch in the provinces. The Directorate of National Education is one of these and is headed by the Director of National Education. He is selected among secondary school teachers and principals, or among inspectors of primary education who have graduated from higher teacher training institutions or from a university.

All educational activities, except for those of the higher schools and institutions directly connected with the Ministry of Education, are under the administration and supervision of the Director of education. This in fact means that primary education is the main responsibility of the directorates of education.

The directorate of education is made up of a cultural, a personnel, and a finance division. There is an assistant director in charge of each division, but according to the regulations assistant directors have to do "what the Directors want them to do". The numbers of divisions and assistant directors can be increased according to needs. In addition, supervisors of primary education, heads of adult education, and other technical personnel carry out jobs defined by the Director according to the regulations. (Appendices A and B)

CHAPTER 2

ANALYSIS OF THE PROVINCIAL AND LOCAL ADMINISTRATION OF EDUCATION IN TURKEY

2.1 Introduction

In recent years, several changes have been made within the central organisation of the National Ministry of Education. It was felt that since all duties, responsibilities and rights involved in educational activities are reflected at the provincial and local levels, adjustments should be made to meet the changing needs at these levels as well as those at the central level. It was therefore decided that an analysis of the provincial and local administration of education in Turkey was essential to the development of a more responsive, more flexible and more efficient organisation of the educational system.

2.2 Statement of the Problem

The main purpose of this study is to examine the existing administrative structure of the formal educational system at the provincial and local levels, and to suggest some changes which might increase the effectiveness and the efficiency of the system at these levels.

2.3 General Methodology

The study has been divided into two inter-related phases, each one consisting of two stages:

(a) Phase I
  (i) Stage A: Analysis of the existing situation;
  (ii) Stage B: Evaluation of the situation analyzed in Stage A.

(b) Phase II
  (i) Stage C: Suggesting the necessary changes;
  (ii) Stage D: Evaluation of the proposed changes*.

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* This stage has not been covered.

Two types of data collection techniques were employed for the study:

(a) Interviews with a sample of Governors, Directors of education, assistant directors and school Directors;

(b) A questionnaire sent to the educational administrators in the provinces (deputy Governors, Directors and assistant directors of education, inspectors, secondary school principals and Directors of primary education).

The questionnaire (Appendix C) was drawn up on the basis of the following preliminary studies:

(a) A review of all the legal documents concerning the functions and roles of Governors and Directors of education and of school Directors;

(b) A review of the reports of the seminar held for all the Directors of education in 1971;

(c) The circulation of an open-ended pre-questionnaire, prepared on the basis of information gathered from the above reviews, to some ex-Governors, Directors and assistant directors.

Turkey was divided into eight geographical regions and, in each region, provinces were divided into developed and less developed ones. The numbers of the primary and secondary schools and the populations of the provinces were also considered and a stratified random sample was prepared (Appendix D).

With the exception of the three largest cities (Istanbul, Ankara and Izmir) the groups studied were taken as a whole. In these three cities, where there were not more than 30 schools, they were all included.

The sample groups were made up of all deputy Governors dealing with the educational matters of the province, all Directors and assistant directors, and all principals of the regional boarding schools (if they also included the middle school) in the related provinces.

The sample groups were those of principals of public secondary schools, inspectors of primary education and Directors of primary education.

The main questionnaire provided information on the following items:

(a) Backgrounds and some of the characteristics of the persons involved;

(b) Problems faced by provincial administrators in education;

(c) Suggestions for improvements of the existing situation by the persons involved;

(d) Some evidence for possible models for the educational activities in the provinces.

CHAPTER 3

THE MAIN FINDINGS OF THE PRELIMINARY STUDIES

3.1 The preliminary studies have provided us with guidelines for designing some models of administrative structure and for identifying some of the problems at the provincial and local levels.

The main findings of the preliminary studies can be summarized as follows:

(a) The great majority of the persons studied were over 35 years of age and the higher their administrative post, the older they tended to be.

(b) Most of the educational administrators are graduates of the pedagogical branches of the educational institutes, but Governors and their assistants tend to be graduates of the Public Administration Division of the Faculty of the Political Science.

(c) The majority of the respondents, with the exception of some Governors and some Directors, do not feel that the kinds of duties they are supposed to carry out now, correspond to the duties which they think they should be carrying out.

During the preliminary studies eleven problems were identified and these problems, which are listed below, were graded by the respondents "a very important problem", "an important problem", and "not a problem".

(1) Political pressure, going beyond legal regulations, by the political members of the Permanent Committee of the province on decisions about appointment and transfer of primary school teachers and administrators.

(2) The authority of councils which are made up of people from outside the profession to deal with the disciplinary matters concerning primary school teachers.

(3) Political pressure by the members of the Permanent Committee on decisions for construction of school buildings.

(4) Insufficient delegation of decisions under the provincial administrative law concerning educational services.

(5) Non-application of the criteria for appointments and transfers of members at the provincial level of education.

(6) Low salaries.

(7) Insufficient delegation of authority for the supervision and control of teachers and administrators.

(8) Lack of organisation in the directorate of provincial education concerning the proper and clear distribution of duties.

(9) Time consuming bureaucratic operations.

(10) Unrelated and conflicting orders often requiring conflicting actions on the same matters from different offices of the Ministry of Education.

(11) Imbalance between duties and rights resulting from the heavy duties and insufficient rights.

Among the eleven problems listed above, problem 11 received the most attention with problem 10 next. In addition, out of the open-ended questions in particular, a check-list of proposals was drawn up. Respondents were asked to say "yes" or "no" to these proposals (Appendix E).

CHAPTER 4

ANALYSIS OF DATA

4.1 The six sample groups in this study were as follows:

- (a) Directors of primary education (D.P.Ed.)
- (b) Inspectors of primary education (I.P.Ed.)
- (c) Secondary school principals (S.S.P.)
- (d) Assistant directors of education (As.D.Ed.)
- (e) Directors of education (D.Ed.)
- (f) Deputy Governors (D.G.)

4.2 Experience in Public Service

More than half of the respondents in the sample groups, with the exception of the secondary school principals, had at least twenty years of experience. This implies that more than half of the respondents, except for the secondary school principals, were over forty years of age.

4.3 Models on Provincial Re-organisation of Public Education

By using the findings of the preliminary studies, three possible models of organisational structures for the provinces were developed:

(a) Model I

(i) Turkey should be divided into regions, made up of several provinces, which would be combined according to certain criteria. For each region, there should be a "regional Chief Director of public education" in charge of all kinds of education and instruction in the region. The provincial Directors of public education should work under his direction.

(ii) In the counties, there should be "county Directors of public education" responsible for all kinds of education and instruction in the county, and they should work under the direction of the provincial Director of public education.

(b) Model II

In the provinces there should be a "provincial Chief Director of public education", or "provincial Director of public education" responsible for all kinds and levels of education and instruction; and under him, there should be a "county Director of public education" in charge of all levels of education and instruction in the counties.

(c) Model III

There should be "Directors of public education" in the provinces and "Directors of primary education" in the counties as there are to-day.

The first model presented a new "decentralized organisation of education", and the second a structure which could be considered "less centralized" than the administrative organisation of education in the provinces to-day. The third represents the existing structures.

Model I was relatively well accepted especially by the principals, inspectors and Directors, but not by any of the deputy Governors. Model II on the other hand, seemed fairly acceptable to almost all the groups in the sample. Secondary school principals, inspectors of primary education and deputy Governors seemed less interested in the second alternative. The third was accepted by a high percentage of the deputy Governors but none of the other groups showed any enthusiasm for it (Appendix F).

None of the models was supported by the majority of all groups. The second received 40.91% support and this seems worth noting. In addition, this model was approved by more than half of the third group (Appendix G).

According to the X^2 tests:

(a) No independency between the sample groups and models was observed

$$X^2_{(5.2)} = 11.07 \; (47.71)$$

(b) The amount of experience which the group members had, did not seem to play a significant part in their preference

$$X^2_{(3.2)} = 12.59 \; (3.54)$$

With the exception of the deputy Governors, most of the respondents would like to see a different structure of educational administration, at the provincial level, from the one which obtains to-day.

4.4 Re-organisation of Administrative Structures at the Village Level

At present, village teachers are members of the Village Elders' Committee. In view of this, the respondents were asked to choose one of the following alternatives:

(a) The situation should not change. The village teacher should continue to be a member of the Village Elders' Committee.

(b) The village teacher should not be a member of the Village Elders' Committee, because the headman of the village, as the chairman of the Committee, becomes the superior of the teacher.

(c) I have another suggestion.

The combined groups did not seem agreed on one choice concerning the place of teachers in village organisation. Rather, they seemed divided between the first two points of view. But the second choice (b) was supported by slightly more people than the first.

4.5 Planning Educational and Instructional Affairs in the Provinces

More than eighty per cent of respondents in the samples felt that the opinions of the provincial administrators should be given more importance in educational planning. The deputy Governors and the Directors especially supported this idea. Most of the respondents pointed out that they do not approve of the way in which present practices are implemented. They themselves would like to have more to say in educational planning.

The group with 21-30 years of experience seemed to want more power over the planning of education at the provincial level than the other groups. In addition, significant proportions of the respondents made the following suggestions:

(a) Regional planning commissions should be established.
(b) Priorities should be given to the less advanced provinces.
(c) Scientific research should precede planning.

4.6 Implementation of the educational Section of the Development Plan

The respondents were asked to mark one of the following choices in terms of personnel needed to implement the educational plan in the provinces:

(a) Existing administrative personnel are sufficient.
(b) The personnel required may be provided through in-service training.
(c) There is a need for specialised personnel with higher education.

In general, the respondents did not feel that educational planning could be assured by the existing personnel in educational administration. They were not, however, in agreement as to whether they preferred to create the necessary personnel through in-service training or to have additional personnel with higher education (Appendix H).

The first and second alternatives in developing and implementing the educational plans in the provinces were chosen most frequently. The third alternative was therefore the least acceptable.

4.7 Responsibility in Planning and Implementation of Building Construction and Equipment in the Provinces

In this matter, the following choices were offered:

(a) The provincial Director of education should be responsible.

(b) School principals should be responsible.

(c) The same officials as to-day should continue to be responsible.

(d) The National Ministry of Education, the provincial Director of education, and the school principal should share responsibility on a better defined basis than to-day's practice.

Nearly half of the deputy Governors and far more than half of the other respondents gave no support to the present practices in school building and the provision of equipment.

Those with more experience tended to prefer the first and to dislike the second alternative. The combined groups were not in favour of to-day's practices.

4.8 Equipment and Operating Expenditures of the Educational Institutions

At the present time, there are two types of budgets in the Turkish educational system. One is the general budget of the Central Government, and the other is the budget included in the special administrative budget of provinces. The second is an important source of finance for primary education. All items of spending on secondary and higher education come from the general budget, but only some of the more important items of the primary schools' funds come from this budget.

The data illustrate that with the exception of secondary school principals, very large proportions of other sample groups accept the idea that the total funds for the equipment and operating expenditures of all educational institutions in a province should be sent to the Office of the Governor, and the province should distribute the money to the institutions according to a plan prepared by the Office of the Governor. In addition, the older the respondent, the greater the support for this choice.

Secondary school principals tend to feel that to-day's system should continue, and that the National Ministry of Education should send the appropriations to the schools directly.

4.9 Identifying and Grading the Problems Encountered by Officials in Carrying out their Duties

The problems identified and graded were as follows:

(a) Insufficient funds (A)

(b) Lack of authority (B)

(c) Ill-defined duties and authority (C)

(d) Frequent demands running counter to accepted principles and plans (D)

(e) Inadequacy in the basic principles governing personnel appointment and transfers (E)

(f) Limiting effects of the law governing the provinces (F)

(g) Inadequate number of personnel (G)

(h) Inadequate number of qualified personnel (H)

(i) Lack of transportation (I)

The elements of the groups were shown (Appendix I) as indicated below:

(1) Primary school principal (P.S.P.)

(2) Secondary school principal (S.S.P.)

(3) Inspector of primary education (I.Ed.)

(4) Assistant director of education (Ass. Dir.)

(5) Director of education (Dir. of Ed.)

(6) Director of primary education (Dir. P. Ed.)

(7) Head of adult education (H. Ad. Ed.)

Each official in the sample chose five problems and graded them from 1, the most important, to 5, the least important.

The groups gave their reactions in a way that seemed to reflect their own jobs. With the exception of inspectors of primary education and assistant directors, the problem of "Lack of Authority" was perceived as the most important problem by all groups. "Ill-defined duties and authority" for the assistant directors, "Lack of transportation facilities" for the inspectors of primary education were the most important problems. Problems A, B, C and D were accepted as important ones, with a second rating. In general, problems A and B were perceived as very important and were given either first or second rating by more than half the groups.

4.10 The Organisation with the Most Important Role in Educational Decision-Making

The respondents did not feel that either the Directors of education, educational specialists, or associations in the community should have the major role in educational decision-making. They felt that this role should fall to the school principals and the National Ministry of Education. The amount of experience of the respondents seems to have had some effect on the distribution of choices. Those with longer experience tended slightly to prefer the National Ministry of Education.

4.11 The Power to Improve Educational Activities in the Provinces

Almost all sample groups concerned seemed to want more power to improve educational activities in the provinces. Quite a significant proportion of Governors (around 37%) pointed out that Directors of education should also have more power. In addition, most of the respondents rejected the idea that present practices should continue.

4.12 Procedures for Appointment and Transfer of Secondary School Teachers

Procedures used in the appointments and transfers of secondary school teachers has been one of the most controversial subjects in Turkey. Various factors are involved, but the teachers tend to see the problem first and foremost as a matter of practice.

The sample groups did not necessarily agree on a specific choice. The differing amount of experience did not seem to make very much difference in the ideas of sample groups in terms of choice of procedures.

Of the secondary school principals, only 15 per cent agreed that secondary school teachers, like primary school teachers, should be placed under the direction of the province, and that the schools to which they are to be assigned should be determined by the provincial authorities. All other groups agreed to this proposal within a percentage of 49 to 90 per cent.

Nearly half of the secondary school principals felt that secondary school teachers should continue to be appointed to the schools by the National Ministry.

4.13 The Governors' Authority in Assigning and Transferring Teachers in the Provinces

At the present time, the appointment and transfer of secondary school teachers is the responsibility of the National Ministry of Education, but the provincial authorities are responsible for the distribution of the primary school teachers within a given province.

The alternatives for the amount of authority the Governors should have in appointing and transferring teachers were as follows:

(a) Governors should have the same authority as at present.

(b) Governors have excessive authority to-day. Their power should be reduced.

(c) Governors should keep their present authority for appointing and transferring teachers, and this authority should include not only primary school teachers, but secondary school teachers as well.

(d) I have a different idea.

The alternatives (a, b and c) were not supported very strongly by combined groups. The third alternative (c) was supported by more than 40 per cent of the respondents, but by 20 per cent only of the secondary school principals.

As the amount of experience of the respondents increased, the amount of authority which is accepted as appropriate for the Governors decreased.

4.14 Limits of Duty and Power of the Provincial Disciplinary Committee of Education

More than half of the respondents preferred a regional disciplinary committee to the existing one. The primary school teachers especially did not seem happy with the duties and power of the Provincial Disciplinary Committee.

With a minimum percentage of 52 all sample groups, except for secondary school principals, preferred the Committee to supervise disciplinary affairs concerning all teachers and administrators in the primary and secondary schools.

More than half of the secondary school principals wanted to-day's Committee to continue as it is. Namely, the Committee should have the power to determine sanctions as provided under law n° 4357, for primary school teachers and administrators only. But none of the Directors of education and only a small proportion of their assistants supported this alternative.

There was a general feeling among the educational administrators in the provinces that members of the political parties, even when they are elected by that province, should not be included in this Committee.

As the number of years'experience of the respondents increased, the support for the idea of having a different kind of committee with different structure, duty and power, became stronger.

4.15 The Problems

The problems in this study were stated by the respondents during the preliminary work. Later, these problems were graded by the respondents according to the criteria of degree of importance, of solution, and frequency of occurrence. The criteria were graded by the respondents as follows:

Degree of Importance			Degree of Difficulty of Solution			Degree of Frequency of Occurrence		
1	2	3	1	2	3	1	2	3
Very Important	Important	Irrelevant	Very Difficult	Difficult	Not Difficult	Very Frequent	Frequent	Not Frequent

The problems below were considered very important, but not difficult to solve; there were also problems which were considered to occur very frequently or frequently. The problems 3, 4, 6, 20, 21, 24 were as follows:

- Lack of clarity about the duties and authority of superiors, Directors of education and school principals (3).
- Lack of experience among school administrators (4).
- When the educational plans for the provinces are being prepared by the Ministry, the ideas and opinions of the Directors of education do not receive sufficient attention (6).
- A widespread conviction that appointments and transfers are being made contrary to regulations and criteria (20).
- The administrators do not on the whole exert their authority fully (21).
- The reports and suggestions which are sent to the Ministry after inspections are not taken into consideration as expected (24).

These six problem areas may be considered as those to which priority should be given.

The following problems were considered by the sample groups as ones which occur very frequently:

- Lack of experience among school administrators (4).
- When the educational plans of the provinces are being prepared by the Ministry, the ideas and opinions of the Director of education do not receive sufficient attention (6).

- The necessary expenditures for education in the provinces have to be obtained from two different budgets (13).

- The authority and responsibility for building construction are not concentrated in the hands of one unit (14).

- Appropriations are not made in accordance with needs (10).

- The present regulations which determine co-operation with the community over educational affairs are inadequate (17).

- The Directors of education are too dependent on the Governors (19).

The problems below were reported to occur frequently by the respondents:

- Uncertainty regarding which duties will be carried out by the province and which ones by the Ministry (1).

- Lack of clarity about the duties and authority of superiors, Directors of education and principals (3).

- Schools in the provinces are not equipped on the basis of plans and programmes (11).

- The plans and programmes prepared for equipping the schools in the provinces, are not carried out along the lines expected (12).

- The planning of educational affairs in the provinces is not based on previous research (5).

- The educational appropriations as between general and technical education are not divided in a balanced way (7).

- There is no authority to distribute funds from the general budget for operating expenditure in the provinces (8).

- The provinces have limited authority to determine the needs for investment (9).

- Administrators do not exert their authority fully (21).

- The centre for the co-ordination of educational affairs for the Directors of education is elsewhere (22).

- Reports and suggestions sent to the Ministry after inspections are not given sufficient consideration (24).

- Inadequacy of the records used to evaluate teachers (25).

- Supervision and investigation are carried out by the same persons (26).

The following problems were considered to occur infrequently:

- Members of the Provincial Disciplinary Committee do not seem to be objective (2).

- Too much dependency upon other ministries in dealing with personnel affairs of the Ministry of Education (15).

- A lack of common criteria developed with the participation of inspectors, administrators and teachers to evaluate educational affairs (23).

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

5.1 The report of the "Strategy and Co-ordination Commission for National Education Reform" states that the general objectives of the educational system are to satisfy the educational needs of the various social systems in a balanced way, and to secure the process of economic and social development; to act as an agent for economic and social change by introducing and developing the technological and other knowledge necessary; and to help society to adjust itself smoothly to the future economic and social conditions.

5.2 Basic Findings and Implications

The present research has given various evidence about administrative, academic and bureaucratic activities, and problems of education in the provinces, districts (or sub-provinces), and villages. This evidence came from the people involved and reflects their preoccupations in their professional lives.

The youngest elements among our groups are the secondary school principals. The minimum level of experience, since age and experience go together, is ten years for all the groups in the sample.

Among the three alternative models for provincial and local organisation of education, one of which is the present model, the second received the most support. It was described as follows:

> "In the provinces, there should be a provincial Chief Director of education, or provincial Director of education, responsible for all kinds and levels of education; under him, there should be a county Director of education in charge of all levels of education in the counties".

The choice which would imply the re-organisation of the provincial and local administration of education by the establishment of regions divided into provinces was second in the amount of support received from the groups. The deputy Governors, however, seemed to be against this choice and, on the whole, they supported the present structure.

The majority of persons in all groups supported the idea of a somewhat improved type of the present organisation at the provincial and local levels. This organisation would be different from either the existing organisation or the proposed region-based one. None of the groups supported the idea of maintaining the present model without change.

The two propositions that "the teacher in the village should not be a member of the Village Elders' Committee", and that "the village teacher should remain as the normal member of the Village Elders' Committee" were supported by similar proportions of the respondents. Rather than supporting one or other of the alternatives strongly, all respondents reported that the co-operation of the teacher with the Elders' Committee is necessary and is rather a matter of human relations than a question of form or organisation.

More than half the Directors of education and deputy Governors felt that the "National Ministry of Education should have the most important role in taking decisions in education". The more experience the respondents had, the more strongly they supported this idea.

The majority of the members on all groups, except for the secondary school principals felt that the Directors of education should be given more power to improve educational activities in the provinces.

All groups, again with the exception of secondary school principals, supported the idea that secondary school teachers should also be placed under the direction of the province, and that the schools to which they are assigned should be determined by the provincial authorities.

The data available give some evidence that the ways in which secondary school teachers are appointed and transferred are not very acceptable. There is a tendency to wish for more decentralized methods for dealing with these matters.

This study shows that the educational directorates in the provinces should be re-organised in such a way as to minimize the possibly negative influences of local politicians, and to deal with the lack of technical and bureaucratic efficiency of the directorates. In addition, Directors of education should co-operate with the Governors; the Directors should not be left in a situation where they have heavy duties and responsibilities with little power or authority.

The respondents seemed to feel that their opinions should have more weight in evaluating teachers. But more than half pointed out that "Inspection and evaluation of teachers should be done by the school principal and that the unsuccessful teachers should be re-evaluated by an inspector". A majority of deputy Governors preferred the present model.

A large majority of respondents felt that the opinions of the provincial authorities should be given more importance in the planning of educational affairs. Almost all Directors of education and deputy Governors felt that the measures included in development plans did not meet the needs of the provinces. The majority of the respondents felt that the need for additional and more qualified personnel could be met through in-service training; but the secondary school principals did not support this idea; they felt it would be better to recruit specialists rather than to provide in-service training for present personnel.

The majority of respondents (65%), including 42 per cent of the deputy Governors, pointed out that present practices in planning and implementation of construction and the provision of equipment should be changed and that the National Ministry, the provincial directorate and school principals should share the responsibilities on a better defined basis. A large number of respondents suggested that the total funds for equipment and operating expenditures of the educational institutions in a province should be sent to the provinces, and the provinces should distribute the money according to a plan.

Some of the evidence revealed by this study shows that there are certain aspects of budgetary practices in the provinces which need attention. One of these is deciding which type of educational activities should be funded by which budgetary sources. The second is the dual practices of budgeting and spending in primary and secondary institutions of education. With the exception of deputy Governors, nearly half the members in all groups pointed out that the special provincial budget should continue to exist but must not be used for educational services; all appropriations should be obtained from the general budget. About 30 per cent of the respondents, would like the general and special budgets to be integrated, or the dual budgetary system to continue with a clearer definition of the shares to be appropriated.

The most important problems which the provincial administrators reported are listed below:

The Problems	Degree of Importance	The Numbers	Total Degree of Importance
(1) Insufficient funds	5-4	5-1	29
(2) Vagueness of duties and authority	5-4-2-1	1-1-3-1	16
(3) Lack of transportation facilities	5	1	5
(4) Lack of authority	4-3-2	4-2-1	24
(5) Frequent demands running counter to accepted principles and plans	4-3-1	1-1-1	8
(6) Inadequacy in the basic principles governing personnel appointment and transfers	3-2-1	2-1-1	9
(7) Limiting effects of the law governing the provinces	3	1	3
(8) Inadequate number of personnel	2-1	1-2	4
(9) Inadequate number of qualified personnel	1	2	2

To come to the other problems examined according to their degree of importance, and "frequency of occurrence", in the last part of the questionnaire, with the exception of problems 2, 15, 16, 18, 20 and 23, all the others were perceived by the groups as either "important problems" which "occurred very frequently" or they had already been noted as "occurring frequently or very frequently". Among all the items, 3, 4, 6, 21 and 24 are the problems which were perceived as "very important". In addition, the problems 3, 4, 6, 21 and 24 were perceived as "very important" occurring "very frequently" or "frequently", but "not difficult to solve". These problems may well be considered as priorities. They are as follows:

- Lack of clarity about the duties and authority of superiors and administrators of education (3).
- Lack of experience among school administrators (4).
- When the educational plans for the provinces are being prepared by the Ministry the ideas and opinions of the Directors of education do not receive sufficient attention (6).
- The fact that administrators do not generally exert their authority fully (21).
- The reports and suggestions sent to the Ministry after inspections are not given sufficient consideration (24).

To summarize, the respondents have on the whole indicated that they would like to see certain changes, especially in the following areas:

(a) Evaluation of personnel and instruction;

(b) Appointment and transfer procedures;

(c) Regulations concerning provincial and local organisations;

(d) Participation in educational finance and planning practices and building construction.

This study has indicated that there are several aspects to work on in the provincial and local organisation of education. The people working in these organisations as administrators seem ready to co-operate and work with those who suggest changes and this may be considered as a very valuable advantage.

It would now be useful to prepare a plan for re-organising the provincial and local organisation of education in Turkey. The other field study which has been carried out to check the results of the present study, especially concerning the problems and suggestions and some other details which are not included here, should be taken into consideration.

CHAPTER 6

LIMITATIONS OF THE STUDY

6.1 This study has provided evidence for our objectives. For several reasons, however, it has also had some limitations which may be explained in the following way:

(a) All of the detailed evidence gathered by the questionnaire could not be reported in this study.

(b) This study has been carried out separately from the study on the Organisation of the Central Ministry*.

(c) Although an attempt was made through interviews, evaluating seminar reports and formal and informal discussions, to eliminate some of the disadvantages of this type of research tool, the study is basically dependent upon a written questionnaire.

(d) There is a possibility of bias arising from pre-conceived ideas, personal problems, emotions and the limited knowledge of the respondents when answering questions about their jobs and experience. In addition, having questions on superior-subordinate relations, and even conflicting relations may also bias the responses.

(e) There is also the difficulty of interpreting and using data which are based on ideas, perceptions and experience.

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* M. Kogan, "The Organisation of the Turkish Ministry of Education", O.E.C.D., September, 1971 (mimeo).

APPENDIX A

I. Rules and Regulations of the Directorates of Provincial Education and Directorates of Primary Education.

II. Duties of the Directors of Provincial Education.

III. Duties of the Directors of Primary Education.

I. RULES AND REGULATIONS OF THE DIRECTORATES OF PROVINCIAL EDUCATION AND OF THE DIRECTORATES OF PRIMARY EDUCATION

A.1 Structure

Article 1 Directors of provincial education, according to provincial administrative law, serve as administrative officers of the province and as Directors of educational services of the Ministry of Education at the provincial level. The Directors are responsible for the administration and control of the following educational institutions and personnel in the provinces:

(a) All private and public institutions of compulsory primary education (day schools, boarding schools, regional schools, travelling schools, travelling teachers) all training courses, classes and private school dormitories and teachers and courses for needy children;

(b) All pre-school institutions, courses and classes attached to institutions of primary education;

(c) All types of secondary, vocational and technical institutions and courses, whether public or private;

(d) Adult education courses and institutions;

(e) Libraries, reading rooms and museums;

(f) Student dormitories and boarding houses;

(g) Any other private schools, courses and classes.

No higher educational institutions of the province nor other institutions attached directly to the Ministry of Education are included in the above list.

Article 2 Assistant Directors of provincial education, supervisors of primary education, Directors of adult education, health supervisors for national education, the staff of the health centres, nutritionists, technical specialists, and those serving on the Research and Advisory Council of National Education, according to regulations, perform the duties delegated to them by the Directors of provincial education. They are responsible to the Directors of provincial education.

Article 3 Directors of primary education are directors of division and are responsible for all the institutions within a district. They apply all laws, regulations, and orders for primary education and adult education within the district.

Article 4 Directorates of primary education should be equipped with an office and the employees necessary to carry out their work.

Article 5 The most senior Directors of education for district centres may be appointed Directors of primary education, for a limited period, if necessary.

Article 6 Directors of provincial education carry out their duties according to provincial administrative law.

Article 7 If necessary, assistant directors of education, or in their absence, the most senior Director of the highest level secondary institution, can be appointed temporarily Director of provincial education. When they are not available, any one of the supervisors of primary education selected by the Director himself can serve in this capacity.

Article 8 Directorates of provincial education have three divisions:

(a) Cultural Affairs Division:

- Education
- Measurement and evaluation
- Administration
- Libraries and museums
- Adult education
- Special education
- Health, nutrition and physical education
- Educational films
- In-service training for teachers
- Supervision, inspection
- Institutions of primary education
- Compulsory education
- Primary educational week and other celebrations
- Statistics
- Clerical work

(b) Personnel records:

- Personnel records
- Disciplinary board for provincial education
- Investigation
- Appointments
- Transfers
- Promotions
- Leaves of absence

(c) Finance Division:

- Budget
- Salary
- Per-diem
- Construction
- Repairs
- Purchases
- General expenses of schools
- All other expenses and payments
- Official equipment

Each of these divisions is administered by an assistant director and other personnel necessary. Those directorates with a heavy work-load can be sub-divided and staffed with more assistant directors and personnel, according to needs. On the other hand, in those directorates where there is little work, some or all of these divisions can be combined under one assistant director, or if there are no other qualified personnel, they may be concentrated in the directorate.

Article 9 The records of the directorate of provincial education are kept by one or more office Directors, according to the workload. It is their responsibility to see that office records are kept orderly and up-to-date.

Article 10 All clerical and other service personnel of the directorates are appointed by the provincial Governor upon the recommendation of the Director of education.

II. DUTIES OF THE DIRECTORS OF PROVINCIAL EDUCATION

A.2 Article 11 The administrative duties of the Directors of provincial education are as follows:

(1) To carry out duties designated by laws, regulations, programmes and orders;

(2) To be responsible for all educational matters of their province, to establish the needs of schools at all levels, to meet those needs when they come within their competence, and to inform the authorities responsible about others which are not within their competence;

(3) To ensure that all educational institutions benefit in a planned way from buildings, sites, equipment and advantages belonging to the provincial national educational office;

(4) To present proposals to the provincial governors office and to the Ministry about the better administration and development of provincial educational matters;

(5) To provide land and sites, and to control school building according to law n° 222 dated 5.1.61;

(6) To determine that school-age children attend schools or other courses and take necessary measures at the beginning of the school year so that the students registered in the primary and secondary schools are distributed evenly;

(7) To provide regional schools, travelling teachers, and training courses for sparsely populated areas and school-less villages;

(8) To find other schools for those students who could not register because of over-crowding;

(9) To provide books and other educational materials according to the decisions of the primary education council and the provincial educational budget. Further, to try to provide for the nutritional and clothing needs of orphans;

(10) To encourage the establishment of P.T.A. and student associations and to supervise the activities of these associations;

(11) To supervise the selling of school books in accordance with the conditions determined by the Ministry;

(12) To collect and send in to the state Statistical Institute the information requested concerning provincial educational matters;

(13) To send in information requested by the Ministry of Education;

(14) To send in reports on the educational services needed at the end of the academic year to the relevant offices of the Ministry;

(15) To prepare and apply programmes concerning celebrations and competitions in which schools participate, with the co-operation of the Directors of the schools;

(16) To determine that all schools within their jurisdiction operate within the established legal constraints;

(17) To organise, through an efficient distribution of duties, the proper timing and orderliness of records, and of correspondence;

(18) To evaluate all applications presented to the office concerning the opening of private schools, courses, student hostels, and boarding houses;

(19) To prevent the opening of illegal schools, or if there are such, to close them and to prevent any teaching of the Arabic alphabet;

(20) To supervise the administration of examinations in primary and secondary schools according to regulations, and to select examination board members - further, to prepare the syllabuses of school Directors;

(21) To determine that activities of education directorates concerning printed materials subject to law n° 2527 be carried out on time;

(22) To chair the commission, or to delegate his authority to a person whom he feels competent to execute the provisions of the auction or selling law n° 2490 concerning schools and cultural institutions;

(23) To co-chair the primary education council;

(24) To evaluate and control the expenditures of secondary schools both from funds appropriated through the general budget and from dormitories and boarding houses, and to ensure that the accounts are properly kept.

Article 12 The cultural duties of the Directors for provincial education are the following:

(1) To achieve the educational objectives established by law, regulations and programmes;

(2) To follow-up the proper application of educational methods in line with accepted national conditions;

(3) To follow closely the application of Turkish republican principles in educational institutions and to protect cultural establishments and students from any dangerous or damaging influences;

(4) To give close attention to cultural activities in the areas of Turkish history, language, music and arts;

(5) To take necessary measures to increase the level of knowledge and productivity in the schools;

(6) To encourage and supervise the opening and development of libraries, so as to increase the number of beneficiaries both inside and outside the schools;

(7) To organise festivities in educational institutions within the limits of their regulations;

(8) To determine that educational text books are provided for students on time, once they have been approved by the Ministry of Education;

(9) To provide text books and educational material to orphans in accordance with the provisions made by the provincial primary educational council and the educational budget of the province;

(10) To follow up the application of nutrition and health programmes for the educational institutions, students, teachers and other personnel;

(11) To secure the development and proper operation of youth, Red Cross and sports activities in the schools;

(12) To set up meetings, courses and seminars to improve the professional and general knowledge of teachers. In addition, to secure that the primary school teachers participate in professional programmes established to coincide with their two-months summer vacation period;

(13) To secure the establishment and productivity of adult education courses and classes to be provided both for children of compulsory school age who cannot continue beyond primary school and for those who are beyond compulsory age. In addition, to provide all necessary educational materials for these schools;

(14) To secure the functioning of village, district, district centre and provincial primary education institutions within the essentials of both the rules of primary education councils and law n° 222, dated 5.1.61. Also, to organise and follow up the relations between school administrators and parents and P.T.A.;

(15) To take measures necessary to protect students from harmful publications and to inform the Ministry about the significant ones;

(16) To try to build sports areas, playing, recreation and camping grounds, and swimming pools for the physical development of students and young people;

(17) To take measures necessary for the protection of all provincial historical, artistic and touristic monuments, and the protection of culture and folklore. In addition, to take measures for the proper excavation of archeological sites;

(18) To assist the state museums in the registration of historical monuments, development of museums, excavation of historical sites, and where there is no state museum, to inform the Ministry of Education of locations;

(19) To control the guidance and counselling research centres and assist their activities;

Article 13 The personnel duties of the Directors of provincial education are the following:

(1) To present proposals to the Ministry of Education through the office of the Governor of the appointment of the following personnel:

- Directors of primary education;
- Directors of public or private, city or district, primary educational institutions;
- Turkish, history, geography and civics teachers of the foreign national schools.

(2) To present proposals to the Governor's office for the appointment of the following personnel:

- Teachers and other personnel for the primary schools of the province;
- Substitute teachers for primary schools;
- Medical and nutritional personnel of the primary schools (health supervisors, regional doctors, travelling health teams, etc.);
- Personnel of the educational directorate of the province;
- Personnel of the libraries, public reading rooms, of travelling, or permanent courses;
- Assistant directors of secondary education institutions; and
- Appointment of primary education supervisors to their regions.

(3) To attach all necessary information and forms (with photographs) about personnel proposed to the Governor's office;

(4) To refer petitions of the primary education supervisors and teachers concerning their transfer to other provinces to the Ministry of Education through the office of the Governor, according to the Rules and Regulations of the Appointment and Transfer of Primary School Teachers;

(5) To inform the Ministry of Education each year at the end of May, through the office of the Governor, about the opening and closing dates of all schools in cities, districts and villages for the following school year, the present number of primary school teachers, and the teacher needs for the coming school year;

(6) To send in information about the teachers who are appointed to the province centres, and those who are transferred within the province and information concerning personnel records to the Ministry of Education through the office of the Governor;

(7) To present proposals about the rewards for better performance earned by the educational personnel to the Ministry of Education, or to the Governor's office;

(8) To sanction, when necessary, the educational personnel of the schools in his province according to law nos. 788, 1702, 1880 and 4357;

(9) To present proposals to the Governor's office concerning the dismissal of any personnel of the directorate when necessary giving reasons;

(10) To send in for approval, all medical reports necessitating official leave of not more than three months for teachers and other personnel, to the Governor's office and those requiring more than three months to the Ministry of Education;

(11) To administer the retirement procedures for personnel reaching retirement age, or those who wish to retire within the rules of the retirement law; further, to present proposals to the Governor's office about the early retirement of those personnel with insufficient qualifications;

(12) To take measures necessary to prevent classes from being without teachers during the absence of the regular teacher for illness or other reasons. In addition, to secure the appointment of substitute teachers for such classes;

(13) To give permission for two-day leaves of absence for personnel not more than three times a year.

III. DUTIES OF THE DIRECTORS OF PRIMARY EDUCATION

A.3 Article 16 The duties of the Directors of primary education are the following:

(1) To carry out duties designated to them by laws, regulations and orders, and to send to the schools all official educational correspondence concerning them;

(2) To inform the Directors of schools of their budget allocations from the district budget, to secure the expenses from the reserved budgets and to ensure that funds are spent according to the purposes designated;

(3) To be responsible for records concerning salaries and expenses of primary education institutions of the district. To approve payments, to keep records of payments and expenses designated by the special administrative law for primary education institutions and to ensure that these payments meet with legal requirements;

(4) To collect and send in educational statistics and the examination results of the primary educational institutions of the district centres and villages to the educational directorate of their province;

(5) To inform the Governor's office daily, through the deputy Governor's office, of changes in the personnel record of teachers in primary education, administrators and other personnel in the district;

(6) To organise meetings at the beginning and at the end of the school year with Directors and assistant directors of institutions of primary education; at the beginning of the school year the meeting includes discussion of primary educational activities of the coming school year, establishment of needs and of the measures to meet them. The meeting at the end of the school year includes the evaluation of the educational activities of the past school year, arrangements for teachers' summer vacations, and professional programmes. Further, it includes measures to be taken concerning the upkeep and repairs of the school grounds and buildings, and the determination of needs. The Governor's office is informed of the results of the meeting;

(7) To inform the office of the supervisor of regional primary education and the Governor's office of matters in the district needing investigation. If he is given orders, the Director should carry out the investigation, write a report and send it to the Governor's office through the deputy Governor's office;

(8) To give permission for a period of two days leave, not more than three times a year, to Directors, assistant directors and teachers in primary education in the district when there are urgent reasons. In addition, to express views on other leave requests sent to the deputy Governor's office;

(9) To attend the primary education council of the district regularly and to carry out duties delegated to him as a member of it and as its second Director;

(10) To inform the administrative law office of decisions in the primary education institutions concerning non-attendance violations of student rules and follow up the results; to investigate the records of school boards concerning parents who refuse to send their children to school despite paying fines twice and to inform the federal court offices;

(11) To secure the selection and registration of lands belonging to the district centre and village schools, or lands providing income to village schools, or, with the authority delegated to him by article 60 of law n° 222 dated 5.1.61, to act as the Director of a commission composed of persons named in this law;

(12) To determine the following needs of his district centre and village and inform the Governor's office through the office of the deputy Governor:

- new primary schools
- regional schools
- travelling schools
- schools or classes
- training courses, classes for compulsory school-age children and for adults
- public classrooms
- libraries
- public reading rooms;

(13) To implement the three-year plans of the district established by article 79 of law n° 222 dated 5.1.61 and prepared by the primary education council;

(14) To keep statistical data on the following matters:

- general population of the district centre and villages
- number of compulsory school-age boys and girls
- distribution of above among districts, sub-districts and villages;

(15) To keep regular personnel records of primary school Directors, assistant directors and teachers in his district;

(16) To collect and send in all statistical information needed by the Governor's office concerning educational matters of the district or other matters;

(17) To take the necessary measures when teachers are absent because of illness for teaching to continue and to make proposals to the Governor's office concerning appointment of substitute teachers for those classes where the regular teacher is to be absent for more than a week;

(18) To secure the proper expenditure and repayment of loans made to the personnel;

(19) To complete sections of reports prepared on teachers and administrators. In addition, to prepare reports on the personnel in his office;

(20) To evaluate the diplomas, examination results and grade books sent by the primary schools and refer them to the directorate of provincial education for their approval;

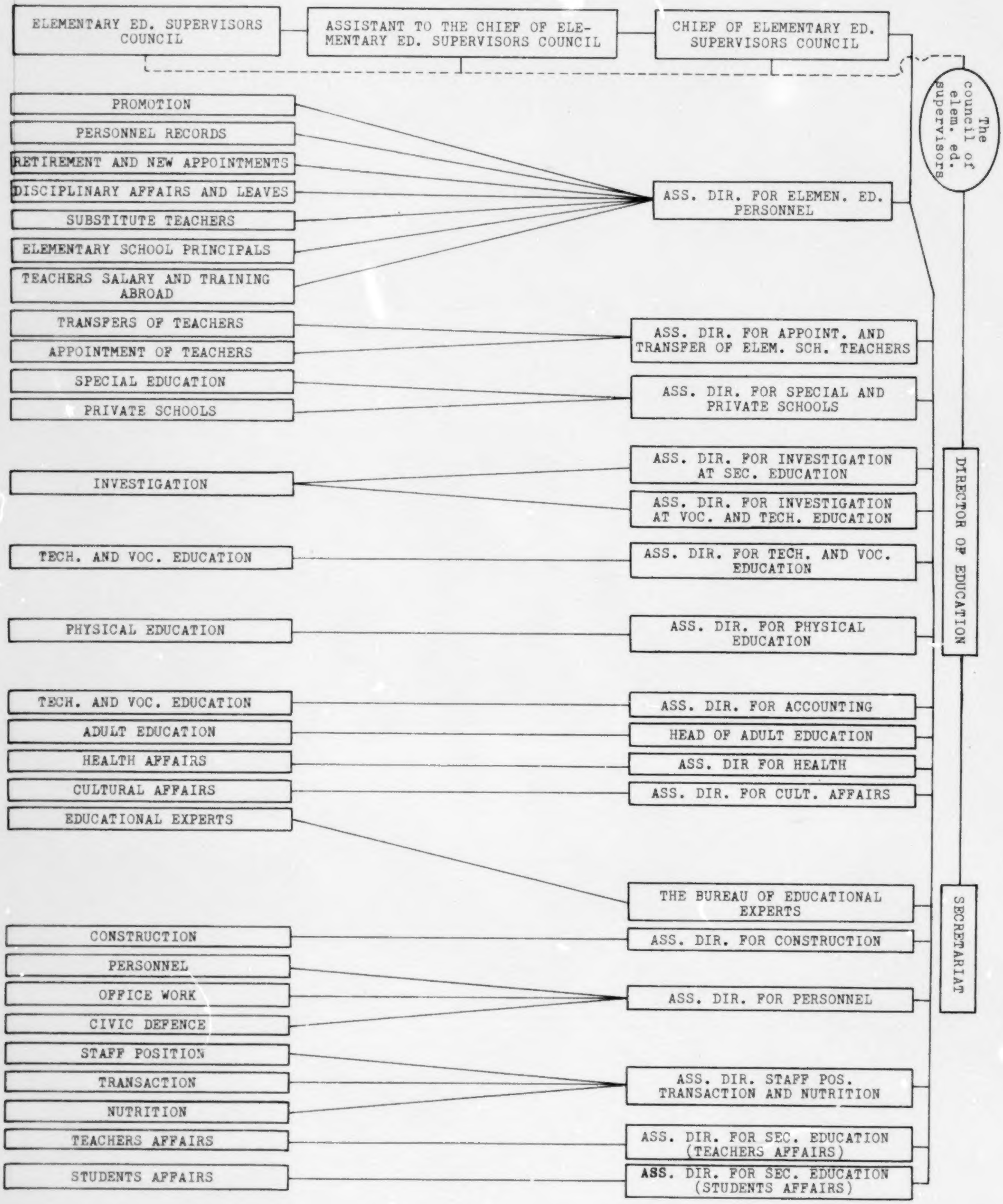
(21) To present proposals to the directorate of provincial education concerning the appointment of service personnel.

Article 17 In addition to the above, the Director of district primary education is responsible for the following duties:

- to carry out some of the duties (3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 19, 20 and 22) listed in Article 11, and to carry out those cultural duties listed in Article 12 concerning this district.

APPENDIX B

THE ORGANISATION CHART OF THE DIRECTORATE OF EDUCATION IN ANKARA


ELEMENTARY ED. SUPERVISORS COUNCIL
ASSISTANT TO THE CHIEF OF ELEMENTARY ED. SUPERVISORS COUNCIL
CHIEF OF ELEMENTARY ED. SUPERVISORS COUNCIL
The council of elem. ed. supervisors
PROMOTION
PERSONNEL RECORDS
RETIREMENT AND NEW APPOINTMENTS
DISCIPLINARY AFFAIRS AND LEAVES
SUBSTITUTE TEACHERS
ELEMENTARY SCHOOL PRINCIPALS
TEACHERS SALARY AND TRAINING ABROAD
ASS. DIR. FOR ELEMEN. ED. PERSONNEL
TRANSFERS OF TEACHERS
APPOINTMENT OF TEACHERS
ASS. DIR. FOR APPOINT. AND TRANSFER OF ELEM. SCH. TEACHERS
SPECIAL EDUCATION
PRIVATE SCHOOLS
ASS. DIR. FOR SPECIAL AND PRIVATE SCHOOLS
INVESTIGATION
ASS. DIR. FOR INVESTIGATION AT SEC. EDUCATION
ASS. DIR. FOR INVESTIGATION AT VOC. AND TECH. EDUCATION
DIRECTOR OF EDUCATION
TECH. AND VOC. EDUCATION
ASS. DIR. FOR TECH. AND VOC. EDUCATION
PHYSICAL EDUCATION
ASS. DIR. FOR PHYSICAL EDUCATION
TECH. AND VOC. EDUCATION
ASS. DIR. FOR ACCOUNTING
ADULT EDUCATION
HEAD OF ADULT EDUCATION
HEALTH AFFAIRS
ASS. DIR FOR HEALTH
CULTURAL AFFAIRS
ASS. DIR. FOR CULT. AFFAIRS
EDUCATIONAL EXPERTS
THE BUREAU OF EDUCATIONAL EXPERTS
SECRETARIAT
CONSTRUCTION
ASS. DIR. FOR CONSTRUCTION
PERSONNEL
OFFICE WORK
CIVIC DEFENCE
ASS. DIR. FOR PERSONNEL
STAFF POSITION
TRANSACTION
NUTRITION
ASS. DIR. STAFF POS. TRANSACTION AND NUTRITION
TEACHERS AFFAIRS
ASS. DIR. FOR SEC. EDUCATION (TEACHERS AFFAIRS)
STUDENTS AFFAIRS
ASS. DIR. FOR SEC. EDUCATION (STUDENTS AFFAIRS)

APPENDIX C

RESEARCH ON PROVINCIAL ORGANISATION

May, 1973.

Department of Planning
Research and Co-ordination
National Ministry of Education
Beşevler-Ankara
Turkey.

Dear Administrator,

We have come to the final phase of the research on the Provincial Re-organisation of the National Ministry of Education, which has been conducted by the Department of Planning, Research and Co-ordination. At this point of the research, through the attached questionnaire, which has been prepared after various studies, we should like to get and make use of ideas from you the administrators in charge of public education and administration.

We thank you in advance for taking the trouble to answer this questionnaire.

EXPLANATION

I. The information we will collect from the questionnaires will be evaluated by computer, and the identity of the person answering the questionnaire will not be disclosed. For this reason, we ask you not to put any name, signature or sign on this paper which will reveal your identity.

II. Choose only one among the possible answers to the questions, and put a circle round the number at the beginning of the answer you select.

1. Where do you work at present?
    1. In a village
    2. In a subdistrict
    3. In a county
    4. In a provincial centre.

If you are working at present in a provincial centre, you put a circle round the number 4 at the beginning of the answer.

III. The answers to the questions should be given as explained at the beginning of each part.

IV. If you feel the space is inadequate, use the empty sheet at the back and identify the part and question number concerned.

Thank you

PART I

(1) Where do you work at present?

1. In a village
2. In a subdistrict
3. In a county
4. In a provincial centre

(2) What is your duty now? (Acting duties may be considered as permanent ones)

1. Director of primary education
2. Inspector of primary education
3. Principal of a secondary school (write the kind of school below)
4. Assistant director of public education in a province
5. Director of public education in a province
6. Assistant Governor of province
7. Governor of province

(3) How old are you?

1. Under 40
2. 41 - 45
3. 46 - 50
4. 51 or over

(4) How long have you been in public service (including military service)?

1. 1 - 10 years
2. 11 - 20 years
3. 21 - 30 years
4. More than 30 years

(5) What is your educational background?

1. I am a graduate of a university or a four-year higher education programme.
2. I took a course or a qualification certificate after high school.
3. I am a graduate of an educational institute.
4. I am a graduate of a teacher training school, high school or school of an equivalent level.

5. If you are a graduate of some other school, explain below.

....

....

PART II

(6) Below you will find three models for the provincial re-organisation of public education. Mark the one you feel is most appropriate. If you have a proposal other than the models listed here, or if you think of some changes or additions to the model which you have chosen, state them also in the answers concerning the models.

Model I

(i) Turkey should be divided into regions, by combining several provinces together according to certain criteria. For each region there should be a regional Chief Director of public education in charge of all kinds of education and instruction in the region: the provincial Directors of public education should work under the direction of the Chief Director.

(ii) In the counties, there should be county Directors of public education responsible for all kinds of education and instruction in the county, and they should work under the direction of the provincial Director of public education.

Model II

In the provinces, there should be a provincial Chief Director of public education, or provincial Director of public education responsible for all kinds and levels of education and instruction: and under him, there should be a county Director of public education in charge of all levels of education and instruction in the counties.

Model III

There should be Directors of public education in the provinces and Directors of primary education in the counties as there are to-day.

Answers: (Mark only one of the answers below)

1. Model I should be implemented
2. I found Model II more appropriate
3. I prefer Model III

   If you have chosen one of the models above and have anything to add, please write it here

   ....

   ....

4. I prefer another model different from any of the three models listed above. (Please explain its characteristics)

   ....

   ....

(7) The teacher and the headman in the village are normally members of the Village Elders' Committee. In view of this, which one of the opinions listed below do you share?

1. The present situation should continue, i.e. the village teacher should remain as the normal member of the Village Elders' Committee.
2. The village teacher should not be a member of the Village Elders' Committee, because the headman of the village as the chairman of the Committee becomes the teacher's superior.
3. I have another suggestion different from either of the opinions listed above. (Please state it)

   ....

   ....

(8) The headman of the village is the chairman of the Primary Education Committee in villages, and the teacher is his assistant, in view of this, which one of the opinions listed below do you share?

1. Since the headman of the village is the chief public administrator in villages, it is reasonable for him to be the chairman of the Primary Education Committee.

2. It is not appropriate for the headman of the village to be the chairman of the Primary Education Committee and for the teacher to be his assistant. The teacher should be the chairman of the Primary Education Committee.
3. I have a different opinion. (Please state it)

....

....

(9) Superiors who report on the conduct and characters of the officials working under them and their code numbers are given below. In your opinion who should be your superiors in reporting on your conduct and character? Write their code numbers in the boxes below. (Write only one number in each box)

Code Number	Superiors to report on your conduct
1	Director of primary education
2	Inspector of primary education
3	Assistant director of public education in the province
4	Director of public education in the province
5	Inspector of the Ministry of Public Education
6	Administration of the subdistrict
7	**Deputy Governor**
8	Governor
9	Section Director concerned in the Ministry of Public Education

Answers:

First Highest in degree	Second Highest in degree	Third Highest in degree
☐	☐	☐

PART III

(10) In the planning of educational and instructional affairs:

1. The measures of the development plan meet the needs of the provinces.
2. The opinions of the provinces should be given more importance.
3. I have another idea. (Please explain)
   ....
   ....

(11) Implementation of the educational plan within the overall development plan:

1. It can be carried out by the existing administrative personnel.
2. The need for necessary additional personnel can be met through in-service training.
3. There is a need for specialised personnel with higher education.

(12) For the planning and realization of building construction and equipment:

1. The provincial Director of public education should be responsible.
2. School principals should be responsible.
3. The officials who are responsible at present should continue to be so.
4. The National Ministry of Public Education, the provincial Director of public education, and the school principal should share responsibility on a better defined basis.

(13) Equipment and operating expenditures of education and instructional institutions:

1. The total funds for the equipment and operating expenditures of all educational and instructional institutions in a province should be sent to the office of the Governor and the province should distribute the money to the institutions according to a plan prepared by the office of the Governor.

[1. Every official should fill in the form, but only five problems should be chosen and graded.
2. Each official should fill in his own column in the form according to the position he holds.]

(14) Some of the problems encountered by officials in carrying out their duties are given below. Choose five of these problems and grade them from 1 to 5 according to their importance and write the degrees of importance in the columns.

1 2 3 4 5
Most important....................Least important

	PROBLEM TABLE								
	THE PROBLEMS AND THEIR DEGREE OF IMPORTANCE								
Officials	Lack of authority	Inadequacy of funds	Vagueness of duties and authorities	Frequent demands contrary to principles and plans	Inadequacy in the basic principles of personnel appointments and transfers	Limiting effects of the laws governing the provinces	Insufficient number of personnel	Insufficient number of qualified personnel	Lack of responsibility
Secondary School Principal									
Inspector of Primary Education									
Assistant Director of Public Education									
Director of Public Education									
Director of Primary Education									
Head of Adult Education									

2. To-day's system should continue and the National Ministry of Public Education should send the appropriations to the schools.
3. I have a different idea. (Please explain)

   ....

   ....

PART IV

(15) Which of the persons or organisations listed below should have the most important role in taking decisions on education and instruction?

1. National Ministry of Public Education.
2. Director of public education.
3. School principal.
4. Experts in education.
5. Associations in the community (Parent-Teacher Associations, etc.).

(16) In order to improve educational and instructional activities in the provinces:

1. Directors of public education should be given more power.
2. Governors should have more power.
3. School principals should have more power.
4. Present practices should continue.
5. I have another idea. (Please explain)

   ....

   ....

(17) Which procedure should be used in the appointments and transfers of secondary school teachers?

1. As is the case for appointments and transfers of primary school teachers, secondary school teachers should also be placed under the direction of the province, and the schools to which they are assigned should be determined by the provincial authorities.

2. Secondary school teachers, as to-day, should continue to be appointed directly to the schools by the National Ministry of Education.
3. Turkey should be divided into regions, and the secondary school teachers should be placed under the direction of the regions, which should assign the teachers to schools where they are needed.
4. There should be different methods from the ones listed above for the appointments and transfers of secondary school teachers. (Please explain)

   ....

   ....

(18) In your opinion, what kind of authority should the Governors have in assigning and transferring teachers in the provinces?

1. Governors should have the same authority as they do at present in the appointments and transfers of teachers.
2. Governors have excessive authority in the appointments and transfers of teachers to-day. Their power should be reduced.
3. Governors should keep their present authority in assigning and transferring teachers, and this authority should include not only primary school teachers; but secondary school teachers as well.
4. I have a different idea. (Please explain)

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(19) The limits of powers and duties of the Provincial Disciplinary Committee of Education:

1. As to-day, the Committee should have the power to determine sanctions, as provided under law n° 4357 for primary school teachers and administrators only.
2. The Committee should supervise disciplinary affairs concerning all teachers and administrators working in the primary and secondary schools in the province.
3. The Provincial Disciplinary Committee of Education should have a different kind of structure with respect to its powers and duty. (Please explain)

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   ....

(20) Which of the bodies or persons below should have the most authority in decision-making concerning building and equipment?

1. General administrative council of the province.
2. Permanent council for the province.
3. Provincial Director of public education.
4. Directorate of the school concerned.
5. I have another idea. (Please explain)

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(21) Which of the authorities listed below should carry out the construction and repairs of educational buildings?

1. This is a job which requires technical and expert knowledge. For this reason, it should be carried out by the National Ministry of Public Works.
2. It should be carried out jointly by the National Ministry of Education and the National Ministry of Public Works, i.e. present practices should continue.
3. It should be carried out by the National Ministry of Education, which should make use of the National Ministry of Public Works. In other words, the Ministry of Education should have more control over these affairs.
4. I have another idea. (Please explain)

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(22) For small building repairs of educational institutions:

1. School principals should be given full power, on the condition that they fulfil certain requirements (estimation of cost, preparing the plan, etc.).
2. Present practices should continue.
3. I have another idea. (Please explain)

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   ....

(23) To meet the school expenses according to the decisions taken jointly by school principals and school associations at the beginning of the school year, and approved by the Governor:

1. A certain amount of money should be paid by parents of students according to some criteria based on the financial means of the parents.

2. Parents should not pay any money.
3. I have another idea. (Please explain)

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....

(24) Should all the materials (except food) needed by the educational institutions in the province be purchased by the office of the Superintendent of Public Education, and distributed to the schools?

1. Yes
2. No
3. I have another idea. (Please explain)

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....

(25) Although it is illegal it is thought that school associations are collecting money and financing some of the expenses of the schools. Which one of the opinions listed below do you hold with respect to this practice?

1. Schools will face great financial difficulties if the associations do not collect certain amounts of money from the students who are registering or renewing their registration. For this reason, money should be collected officially, and in a more strictly controlled manner.
2. The money collected by the associations is of no use. This practice should cease.
3. I have another idea. (Please explain)

....

....

(26) In which of the activities listed below do you find there is the most friction or conflict in your relationship with your superiors? (Mark only one answer please)

1. In the affairs of personnel assignments and transfers.
2. In the affairs of purchase and sale, and appropriations.
3. In disciplinary affairs of teachers.
4. In educational and instructional affairs.
5. In the affairs connected with my personal life.
6. In the affairs connected with undisciplined students.

(27) In making modifications required by the community in curricula:

1. School principals should have the authority to decide.
2. A committee made up of the school principals in the province should have the authority to decide.
3. Present practices should continue.
4. I have another idea. (Please explain)

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....

(28) Some people believe that the Primary Education Committee no longer has a function. There are members of the Committee who have no connection with the subject. Committees do not meet very often. You may or may not share this opinion but which of the ideas listed below do you accept?

1. The Primary Education Committees as they are at present can fulfil their functions. There is no need to make changes in the duties, authority, composition of members, or structures of the Committees.
2. Primary Education Committees deal with only one part of education. An education committee to deal with education as a whole in every province, centre or county should replace the Primary Education Committees.
3. An education committee to be solely responsible for all educational and instructional activities should be set up in every province.
4. I have another idea. (Please explain)

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(29) Educational and instructional activities in the provinces:

1. The authority of the Director of public education should be increased.
2. The authority of the Governors should be increased.
3. The authority of both Governors and Directors of public education should remain as they are.
4. I have another idea. (Please explain)

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....

(30) In your opinion, how does the degree of your dependence on the other Ministries (transfers to the place where wife or husband works, building construction, administration of the budget, the laws governing the provinces, etc.) affect the co-ordination necessary for the successful administration of educational and instructional affairs?

1. The degree of dependence on other ministries makes co-ordination easier.
2. The degree of dependence on other ministries should be reconsidered: it hinders co-ordination.
3. The degree of dependence on other ministries does not affect the co-ordination of my duties in either a positive or a negative way.

(31) In which area do you have the most difficulties in relationships with public and other institutions? (Mark only one answer please)

1. Difficulties arise from the present regulations.
2. Difficulties have their roots in the community and its institutions.
3. Difficulties arise from the lack of authority.
4. Difficulties are created by political pressure.
5. I do not have any serious difficulties in this respect.

(32) There are differences of opinion as to whether the committees set up under law n° 222 function satisfactorily or not. Which of the opinions listed below do you share? (Please mark only one answer)

1. These committees function satisfactorily.
2. The main obstacle is the lack of co-ordination among different departments.
3. These committees are not able to function as they should because the superintendent of public education has insufficient authority.
4. These committees are not able to function as they should because personnel from other departments do not exercise their responsibilities.
5. These committees cannot function. They should be abolished.
6. I have another idea. (Please explain)
   ....
   ....

(33) What do you think of the criteria and methods used in appointing and transferring the officials listed below? Do you think that the appointments and transfers of the following educational administrations should continue in the present way?

		Yes (1)	No (2)
a.	Director of public education	☐	☐
b.	Assistant director of public education	☐	☐
c.	Inspector of public education	☐	☐
d.	Director of primary education	☐	☐
e.	Headmaster of primary school	☐	☐
f.	Secondary school principal	☐	☐

If you gave negative answers above, write your suggestions below in separate paragraphs for every "no" answer, indicating the official concerned.

....

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PART V

(34) The evaluation of educational and instructional affairs:

1. Should be done by inspectors.
2. Should be done by the inspector, using common measures developed by the inspector, administrator, and teacher.
3. Should be done by the inspector and administrator separately.
4. I have another idea. (Please explain)

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....

(35) The evaluation of teachers:

1. More weight should be given to the opinion of the inspector.
2. More weight should be given to the opinion of the ministry.
3. More weight should be given to the opinion of the headmaster.
4. The higher the office involved in the evaluation, the less weight it should carry in evaluating the person involved.
5. The weight of an evaluation should increase proportionately with the rank of the office involved.

(36) The inspection and evaluation of teachers:

1. Should be done by the headmaster alone and his report should be the basis for promotion.
2. Should be done by the headmaster and unsuccessful teachers should be evaluated a second time by an inspector.
3. Present methods should continue.
4. I have another idea. (Please explain)

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(37) The inspection and evaluation of educational and instructional affairs in the provinces:

1. Should be done by a committee of inspectors to be set up under the direction of the Director of education, and should include the inspection of all kinds of educational institutions, excluding higher education.
2. The former system should be maintained.
3. I have another idea. (Please explain)

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(38) Instructional registers used for evaluation of teachers:

1. Should be abolished.
2. Should continue but be revised.
3. Should be filled in by the headmaster alone and his opinion should prevail.
4. The present system should be maintained.

(39) In one of our fairly large provinces there are 31 secondary schools with 500 teachers. In the same province there are 2,000 primary school teachers. If the superintendent of public education is to spend only one hour of class work with each of the secondary school teachers, as a basis for his evaluation this amounts to 500 hours work. Another duty of the superintendent of public education is to examine the instructional reports of those 500 teachers and also to judge reports of the 2000 primary school teachers. He has to sign nearly 18,000 diplomas and almost the same number of registration books for diplomas and a large number of books for class promotion. To examine and sign the inspectors' reports and mid-term reports, to attend the meetings of the commissions and committees and to arrange and supervise personnel appointments and transfers are among his other duties. Given this situation, which one of the following points of view do you feel to be most appropriate?

The Director of public education in this specific province:

1. Has sufficient time to carry out the functions listed above.
2. Does not have sufficient time to carry out all of these duties properly.
3. I have another idea about the necessary time needed to carry out these duties. (Please explain)

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   ....

(40) The Director of public education:

1. Can carry out the duties indicated in question (39) only as a matter of routine
2. Can carry the duties out properly.
3. To carry out these duties properly, he should be given more authority and increased facilities.

(41) It is said it takes a good deal of time for the Director of public education to sign diplomas. On the other hand, there are people who feel that his signature increases the value of the diploma. Which one of the following ideas do you accept?

1. The Director of public education should sign the diplomas. It doesn't take up too much time.
2. Both the signing of diplomas and books for registration of diplomas and class promotion should be the duty of the assistant director of public education.
3. I have a different idea. (Please explain)

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PART VI

(42) In the provinces, the necessary funds for educational services are supplied from the general budget and from the special provincial budget. This system has some disadvantages. Which one of the following arrangements would be most likely to eliminate these disadvantages?

1. It should be definitely decided which of the education services of the provinces are to be carried out by central administration and which by the provincial administration. The general budget and the special provincial budget should continue to exist side by side.
2. The general budget and the special provincial budget should be integrated.
3. The special provincial budget should continue to exist but should not be used for educational and instructional services; all kinds of appropriations should be obtained from the general budget.

(43) The Provincial Disciplinary Committee of education administers the sanctions laid down in the law n° 4357 for the primary school teachers and administrators. The chairman of this Committee is the Governor, its members are the Director of public education, the members of the Permanent Committee, the senior Director of the secondary schools in the province, a primary school inspector and a primary school teacher. When necessary, the Governor may appoint the superintendent of public education as a representative (in place of himself). Given this situation and considering the applications carried out until now, mark which one of the following ideas you accept.

The composition of the Provincial Disciplinary Committee:

1. Should keep its present form.
2. There should not be a member of the Permanent Committee on this Committee, the others should remain the same.
3. The member of the Permanent Committee should be replaced by the Director of the legal affairs of the province.
4. The composition of this Committee should be different. (If you are of this opinion, please explain in detail)
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   ....

(44) What do you think of someone from the Permanent Council of the province being a member of the Provincial Disciplinary Committee?

1. It is appropriate as a part of democratic life and he would defend the rights of the district he was chosen for.
2. It is unnecessary and even a problem for a member of the Permanent Council of the province to be a member of the Provincial Disciplinary Committee which is concerned with sanctioning primary school teachers.
3. It is not a problem for him to be a member of the Provincial Disciplinary Committee, but it is unnecessary.
4. I have another idea. (Please explain)

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(45) In carrying out your duty during the last two years, what was it that you most wanted to be developed or changed in connection with the regulations (law, rule, regulations). Give details.

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PART VII

PROBLEMS	PROBLEM GRADING TABLE								
	Degree of Importance			Degree of Difficulty of Solution			Frequency of Occurrence		
	1 Very Important	2 Important	3 Irrelevant	1 Very Difficult	2 Difficult	3 Not Difficult	1 Very Frequent	2 Frequent	3 Not Frequent
(1) Uncertainty regarding which duties will be carried out by the province and which duties will be carried out by the ministry within the province.									
(2) Doubt about the objectivity of the members of the Provincial Disciplinary Committee of public education.									

The Problems (continued)

(3) Lack of clarity about the duties and authorities of administrative superiors, Directors of public education, and school principals.

(4) Lack of experience of school administrators.

(5) The planning of educational and instructional affairs in the provinces is not based on research and studies made throughout the province.

(6) When the educational and instructional affairs of the provinces are prepared by the Ministry, the ideas and opinions of the Director of public education do not receive sufficient attention.

(7) Educational appropriations are not divided in a balanced way between general and technical instruction.

(8) The fact that the authority to distribute funds from the general budget for operating expenses is not under the direction of the province.

(9) The fact that the province has a limited authority in determining needs for investment.

(10) Appropriations are not made in accordance with needs.

(11) The equipping of schools in the province is not made according to plans and programmes.

(12) The plans and programmes for equipping of schools in the province are not carried out as expected.

(13) Having to obtain the necessary expenditures for provincial public education from two different budgets and local administration budget.

(14) Authority and responsibility for building construction are not concentrated in the hands of one unit.

(15) Being too dependent on other ministries for personnel affairs of the Ministry of Education.

(16) Failure to carry out educational affairs in co-operation with the community, being caused by the pressure groups in the community having too large a role.

(17) Inadequacy of the present regulations governing co-operation with the community over educational affairs.

(18) The school principal has no authority to grant leave to teachers even for valid legal reasons.

(19) The Directors of public education are too dependent on the Governors.

(20) The widespread conviction that appointments and transfers are being made contrary to regulations and criteria.

(21) The fact that administrators do not generally exert their authority fully.

(22) The fact that the directorate of public education is not the only centre for the co-ordination of educational and instructional affairs in the province.

(23) The fact that there are no common criteria developed with the participation of inspectors, administrators, and teachers for the evaluation of educational instructional affairs.

(24) The fact that the reports and suggestions sent to the Ministry after inspections are not taken sufficiently into consideration.

(25) The fact that the teaching records used to evaluate teachers are inadequate.

(26) The fact that inspection and investigation are carried out by the same persons.

APPENDIX D

PROVINCES (SAMPLE)

Istanbul Çanakkale Kirklareli	I
Zonguldak	II
Samsun Gümüşhane Rize	III
Izmir Muğla Uşak	IV
Ankara Sivas Kayseri Kirşehir Bilecik	V
Erzurum Elaziğ Diyarbakir Van	VI
Içel Adiyaman Hatay	VII
Denizli	VIII

APPENDIX E

PROPOSALS

E.1 Proposals concerning the Directorate of Provincial Education

(1) The structure (establishment, divisions) of the directorate of provincial education administration should remain the same.

(2) The qualifications of the Director of provincial education and assistant director of provincial education are sufficient.

(3) Present number of personnel (excluding clerical and service employees) in the directorate of provincial education should remain the same.

(4) Present distribution of the duties (Governor, Director of provincial education and assistant director of education) in the directorate of provincial education should remain the same.

(5) Present duties of the Director of provincial education should remain the same.

(6) Present educational duties of the provincial Governors should remain the same.

(7) Present duties of the assistant director of education should remain the same.

E.2 Proposals concerning the District Centre and District Directorate of Primary Education

(8) Present structure of the district centre and district directorates of primary education should remain the same.

(9) The qualifications of the Directors of primary education are sufficient.

(10) Present number of personnel (excluding the clerical and service employees) in the directorate of primary education should remain the same.

(11) Present distribution of the duties (deputy-Governor, Director, Director of primary education and assistant director of primary education) in the directorate of primary education should remain the same.

(12) Present duties of the Director of primary education should remain the same.

(13) Present educational duties of deputy Governors should remain the same.

(14) Present educational duties of Directors of education for sub-districts should remain the same.

(15) Present educational duties of village heads should remain the same.

(16) Greater emphasis should be given to educational matters in the directorate of provincial education.

(17) Members of the permanent commission on the Provincial Disciplinary Committee should be removed.

(18) The directorate of provincial education should participate in the resolution of conflicts and the inspection of institutions of secondary and higher education.

(19) The administrative law of the provinces should be changed to delegate a greater degree of authority in the administration and planning of provincial education.

(20) Directorates for adult education should be replaced by assistant directorates of adult education.

(21) Opinions of the Directors of provincial education should be considered in the appointment of assistant directors of education.

(22) Law n° 222 designates several councils and commissions for the resolution of many problems. These councils and commissions function very slowly. This situation should be changed.

(23) Personnel matters (appointment, promotion, and other) of the primary and secondary school teachers and administrators should be dealt with by the provincial government.

(24) Regions should be established, encompassing provinces with similar socio-economic and cultural problems and in these regions, a chief directorate of education for these related provinces should be established.

(25) Construction of educational institutions at all levels by the Ministry of Public Works should be transferred to directorates of provincial education. In addition, for the co-ordination and administration of such duties, a general directorate for building should be established in the central administration of the Ministry of education.

(26) Provincial administrative law should be changed.

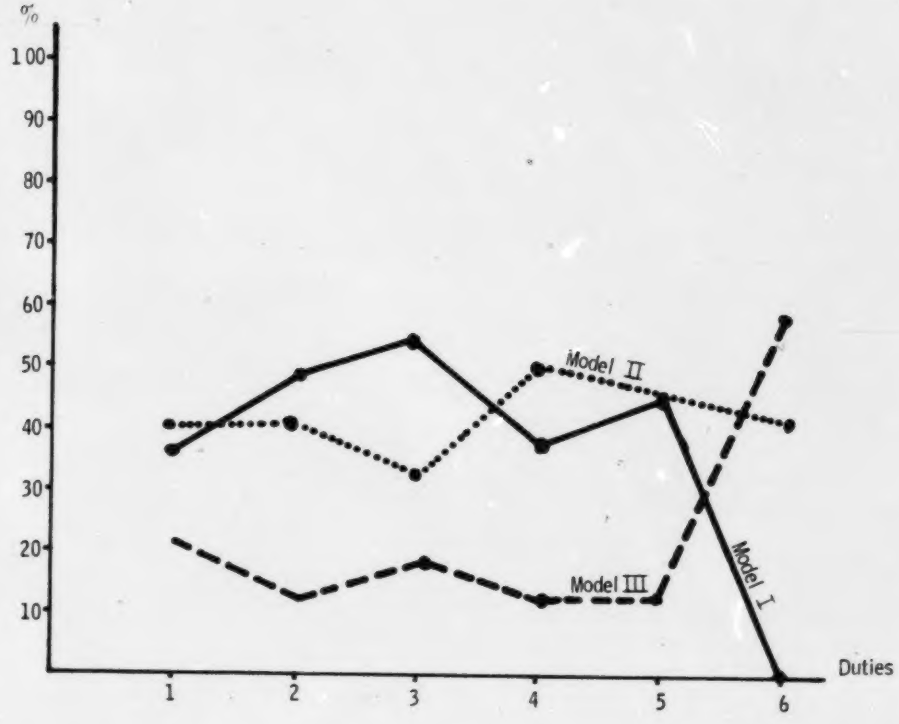
(27) The distribution of duties among assistant directors of education should be arranged according to regional specifications instead of levels of education and each assistant director should be responsible for all educational matters of his region.

(28) The provincial administrative law should be changed to delegate greater authority to Directors of provincial education in educational matters, administration and planning.

(29) The present assistant directorates of education should remain the same.

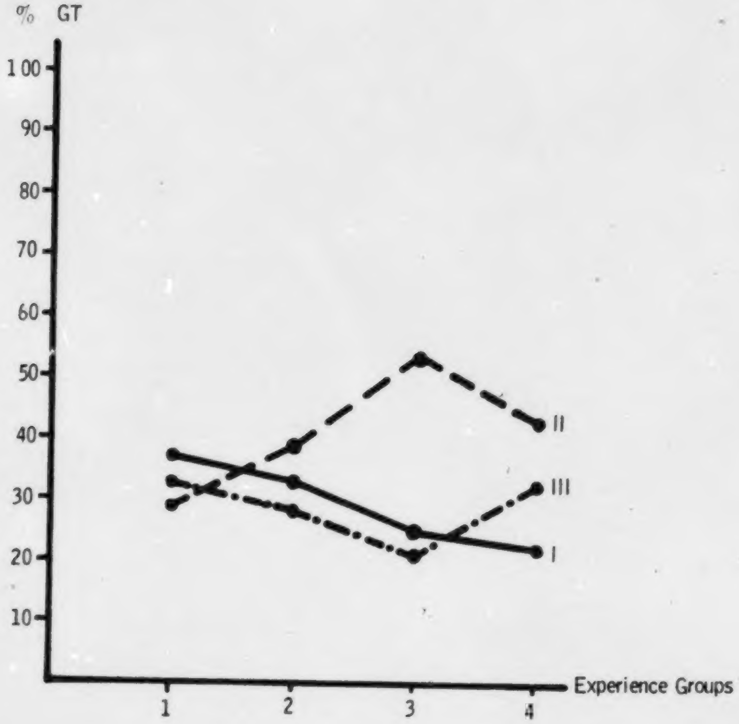
APPENDIX F

SELECTION OF MODELS



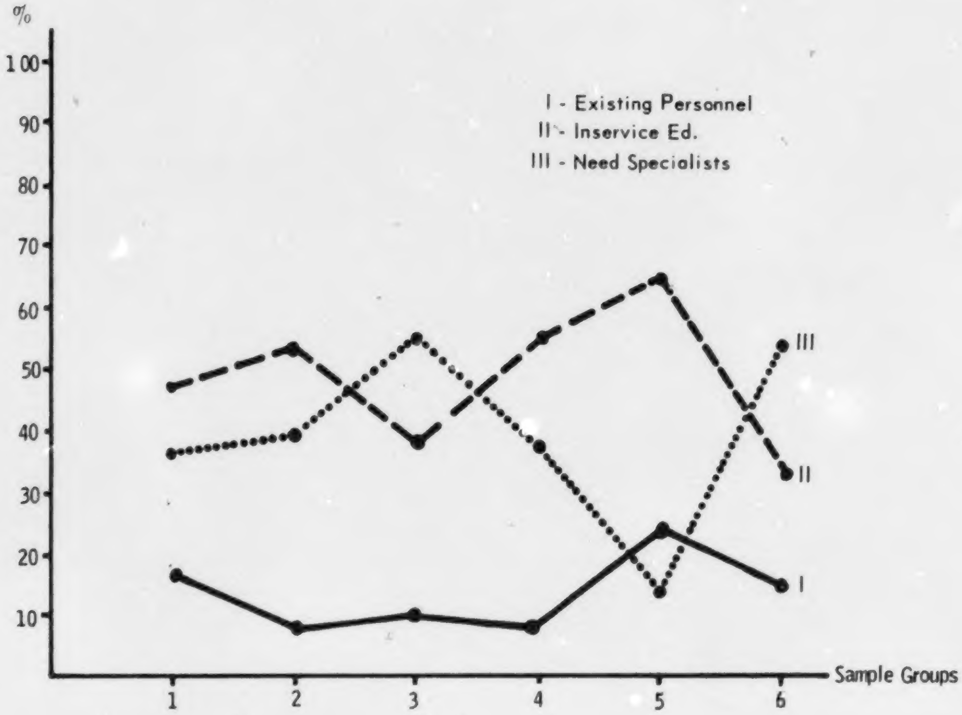
APPENDIX G

SELECTION OF MODELS (ACCORDING TO EXPERIENCE GROUPS)



APPENDIX H

IMPLEMENTATION OF THE PLAN AND ADMINISTRATIVE PERSONNEL



APPENDIX I

THE PROBLEMS AND DEGREES OF THEIR IMPORTANCE
(THE SUMMARY TABLE FOR ALL GROUPS)

Elements of the Groups	Degrees of Importance (1 to 5)				
	1	2	3	4	5
P. S. P. (1)	B	A	E	C	G
S. S. P. (2)	B	A	E	G	C
I. Ed. (3)	I	B	A	C	D
Ass. Dir. (4)	C	A	D	E	H
Dir. of Ed. (5)	B	A	F	A	G
Dir. P. Ed. (6)	B	A	I	C	E
H. Ad. Ed. (7)	B	C	A	I	H